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AIR POLLUTION ABSTRACTS. VOLUME 4, NUMBER 4, APRIL 1973, 26244-26766

Air Pollution Technical Information Center
Research Triangle Park, North Carolina

April 1973

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This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. This issue contains abstracts 26244 - 26766.

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AIR POLLUTION ABSTRACTS

VOLUME 4, NO. 4 APRIL 1973

Prepared by
Air Pollution Technical Information Center (APTIC)
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Author Index AI-1

Personal authors are arranged alphabetically. The names are presented last name first. When the author is a primary author an asterisk precedes the Abstract Number.

INTRODUCTION

This periodical is intended to inform personnel of the Environmental Protection Agency (EPA), and others who are also professionally interested in air pollution, of selected technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given.

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As another service, abstracts of all of the literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of the lapse of time entailed by editorial, make-up, and printing work. More than 1400 subject index terms are available for such searching ---more than those included in the subject index in each issue.

Feedback from our users, including suggestions of articles for abstracting, are always welcome.

APTIC Publications

Odors and Air Pollution: A Bibliography with Abstracts, October 1972, GPO No. EP 4.9:113, $3.00.

Mercury and Air Pollution: A bibliography with Abstracts, October 1972, GPO No. EP 4.9:114, $1.25.

Air Pollution Aspects of Emission Sources: Petroleum Refineries - A Bibliography With Abstracts, July 1972, GPO No. EP 4.9:110, $1.25.

Air Pollution Aspects of Emission Sources: Iron and Steel Mills - A Bibliography With Abstracts, May 1972, GPO No. EP 4.9:107, $1.00.

Air Pollution Aspects of Emission Sources: Boilers - A Bibliography With Abstracts, May 1972, GPO No. EP 4.9:105, $2.00.

Hydrochloric Acid and Air Pollution: An Annotated Bibliography, July 1971, GPO No. EP 4.9:100, $0.55.

Chlorine and Air Pollution: An Annotated Bibliography, July 1971, GPO No. EP 4.9:99, $0.55.

Air Pollution Aspects of Emission Sources: Electric Power Production - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:96, $2.25.

Air Pollution Aspects of Emission Sources: Cement Manufacturing - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:95, $0.50.

Air Pollution Aspects of Emission Sources: Sulfuric Acid Manufacturing - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:94, $0.65.

Air Pollution Aspects of Emission Sources: Nitric Acid Manufacturing - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:93, $0.45.

Air Pollution Aspects of Emission Sources: Municipal Incineration - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:92, $1.00.

Photochemical Oxidants and Air Pollution: An Annotated Bibliography (2 Volumes), March 1971, GPO No. EP 4.9:88, $6.25.

Beryllium and Air Pollution: An Annotated Bibliography, February 1971, GPO No. EP 4.9:83, $0.40.

Asbestos and Air Pollution: An Annotated Bibliography, February 1971, GPO No. EP 4.9:82, $0.50.

Municipal Incineration: A Review of Literature, June 1971, GPO No. EP 4.9:79, $1.00.

Hydrocarbons and Air Pollution: An Annotated Bibliography (2 Volumes), October 1970, GPO No. HE 20.1309:75, $5.00.

Nitrogen Oxides: An Annotated Bibliography, August 1970, GPO No. HE 20.1309:72, $2.75.

Air Pollution Translations: A Bibliography With Abstracts Volume I, May 1969, GPO No. FS 2.93/3:56, $1.75.

Air Pollution Translations: A Bibliography With Abstracts Volume II, April 1970, GPO No. HE 20.1309:69, $1.00.

Carbon Monoxide, A Bibliography With Abstracts, 1966, GPO No. PHS 1503, $2.50.

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RECENT CONTRACT AWARDS

from the

Durham Contract Operations
Contracts Management Division, EPA

Contract No. 68-02-1072, RFP No. Du-72-A138 .... *$48,225*
DEVELOPMENT OF A TRAINING COURSE-AUTOMOTIVE EMISSION CONTROL FOR AIR POLLUTION CONTROL AGENCY FIELD INSPECTORS AND ENGINEERS.
Data-Design Laboratories, 7925 Center Avenue, Cucamonga, California 91730

Contract No. 68-02-0698, RFP No. Du-72-B484 .... *$111,955*
DEVELOPMENT OF METHODOLOGY TO DETERMINE THE EFFECTS OF FUELS AND ADDITIVES ON ATMOSPHERIC VISIBILITY.
Calspan Corporation, P. O. Box 235, Buffalo, New York 14221

Contract No. 68-02-0741 .... *$143,107*
LABORATORY ANALYSIS OF AEROMETRIC AND RELATED SPECIMENS COLLECTED THROUGHOUT THE CHESS NETWORK.
Ryckman, Edgerley, Tomlinson and Associates, Inc., 12161 Lackland Road, St. Louis, Missouri 63141

Contract No. 68-02-0719 .... *$244,500*
COMMUNITY STUDY ON PESTICIDES.
State of California, Department of Public Health, 2151 Berkeley Way, Berkeley, California 94704

Contract No. 68-02-0745 .... *$50,900*
STUDY OF INDOOR AIR QUALITY.
TRC-The Research Corporation of New England, 123 Silas Deane Highway, Wethersfield, Connecticut 06109

Contract No. 68-02-1101 .... *$33,070*
DATA ACQUISITION AND HANDLING SYSTEM FOR USE WITH PDP-11 MINI-COMPUTER.
Digital Equipment Corporation, 3700 Chapel Hill Boulevard, Durham, North Carolina 27707

Contract No. 68-02-0744 .... *$99,021*
EVALUATION OF PROPOSED REGULATIONS FOR EQUIVALENT METHODS.
California Department of Public Health, 2151 Berkeley Way, Berkeley, California 94704

Contract No. 68-02-0725, RFP No. Du-73-B318 .... *$56,771*
PREPARATION OF GAS SAMPLING SOLUTION AND ANALYSIS OF SO2 SAMPLES.
Research Triangle Institute, Research Triangle Park, North Carolina 27709

Contract No. 68-02-1070, RFP No. Du-73-A034 .... *$189,723*
THE STACK TESTING OF INCINERATOR AND BOILER INSTALLATIONS IN THE SOUTH BRONX AND UPPER MANHATTAN.
Environmental Conservation Research, Inc., 50 Wolf Road, Albany, New York 12201

Contract No. 68-02-0756, RFP No. Du-73-C653 .... *$78,278*
PREVENTIVE MAINTENANCE, PLANT OPERATIONS, SHOP SERVICES FOR EPA FACILITIES.
Halifax Engineering, Inc., Shirley Highway at Edsall Road, Alexandria, Virginia 22314

Contract No. 68-02-0730, RFP No. Du-73-B286 .... *$124,805*
HEALTH ASPECTS OF PESTICIDES ABSTRACT BULLETIN.
The Franklin Institute, 20th and Benjamin Franklin Parkway, Philadelphia, Pennsylvania 19103

Contract No. 68-03-0085.. *$77,582*
REVISE CODE AND PROCEDURES USED IN THE PESTICIDES EXPOSURE DATA SYSTEM.
Chase, Rosen & Wallace, Inc., 901 N. Washington Street, Alexandria, Virginia 22314

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SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry--e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS--HUMAN HEALTH

Covers medical and epidemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. EFFECTS--PLANTS AND LIVESTOCK

Effects on vegetation--crops, trees, other plants--and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS--MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractual activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

1972

26244 **APTIC NO. 47945**

Niigata Prefectural Health Research Inst. (Japan) and Niigata Prefectural Research Inst. for Public Nuisances (Japan)

INVESTIGATIONS OF FLUE DUST AND FLUORINE, AUTOMOTIVE EXHAUST GAS AND OTHERS. (End nado no baijin, fusso chosa, hoka). Text in Japanese. In: 1971 Annual Report. No. 6. p. 40-44, Aug. 1972.

The dust and fluorine content of flue gases were investigated at 30 spots in four companies operating in Niigata Prefecture to find that they were all below the regulatory criteria. Atmospheric concentration of sulfur oxides in the Yahiko-mura area was measured at seven selected spots for total of 70 times. The values obtained were generally very low. At the Aoumi-cho and Niigata Higashi-ko districts, suspended dust was measured by hi-volume samplers three times a month for total of 108 times. Analysis of automotive exhaust gas was conducted at Joetsu City, Kameda Town, and Kashiwazaki City where automotive traffic is generally congested. In a few selected districts of Niigata City, sulfur dioxide in the atmosphere was measured by the pararosaniline method, fluoride by the alkaline filter paper method, and suspended dust by the hi-volume sampler method, for 4 days from July 5 to July 8. An air pollution survey for the old Naoetsu district was also conducted. Other investigations performed during the year include surveys on effects of air pollution on plants, surveys on emission sources of harmful substances, and radioactivity in rain, suspended dusts, soils, and water. The results obtained from these investigations are tabulated.

26245 **APTIC NO. 48101**

GM S AMERICAN REVOLUTION, 1976. Autocar, 137(3981):4-6, Aug. 3, 1972.

General Motors plans for a 1976 model Chevrolet Nova with a Wankel rotary engine are described. The car will have front-wheel drive and a two-rotor engine mounted transversely above the final drive to the front wheels. Engines with rotor widths of 3 and 4 in., respectively, are being considered. The respetive output of these engines could be 160 and 200 bhp at about 6500 rpm. The power steering equipment will operate radically simplified steering knuckles. Connections for oil and water supply and for pump and accessory drives will be attached to the transmission system to allow simplification of the main Wankel engine elements. Engineers are working on a method for stratifying the fuel-air mixture in the combustion chamber through simple carburetion instead of expensive fuel injection. This could make the Wankel engine internally clean enough to meet 1976 emission laws. If further exhaust gas purification is required, catalytic reactors will probably be used.

26246 **APTIC NO. 48108**

TURNING ON THE HEAT. Surveyor, 140(4182):17-18, Aug. 4, 1972.

A natural gas-fired district heating system in Peterborough, England, will supply full heat and hot water to 3700 homes plus factories, schools, shops, and office buildings. The gases emitted from the central boiler plant consist only of carbon dioxide and steam with a very small proportion of sulfur. Because the system uses water treated with a rust inhibitor, there is minimum scaling-up and rusting of radiators and pipework. A typical charge is $4.20/wk for a three-bedroom house. Ultimate boiler plant and circulation capacity will be 42.4 mw (145 million Btu/hr).

26247 **APTIC NO. 48189**

GAS-FIRED DISTRICT HEATING FOR NEW TOWN. Heating and Ventilating Eng., 46(543):187-191, Oct. 1972.

A gas-fired district heating system is discussed. It is a low-temperature hot water system operating at 83 C during the summer, rising to 95 C maximum in winter. A 40-mile network of mains will distribute the heat from a natural-gas boiler plant, with propane gas standby. Boiler plant and circulation capacity will be 145 million Btu/hr. The district heating system provides heat for commercial facilities and domestic purposes. Feasibility and design studies of the heating system are discussed, and the design criteria are reviewed. The boiler house and plant, the distribution network, and heat metering are described. Costs of installation, fuel and electricity, maintenance, and replacement are considered.

26248 **APTIC NO. 48337**

Thermo Electron Corp., Waltham, Mass., Research and Developmemt Center

DETAILED DESIGN: RANKINE-CYCLE POWER SYSTEM WITH ORGANIC-BASED WORKING FLUID AND RECIPROCATING EXPANDER FOR AUTOMOBILE PROPULSION. VOLUME II. APPENDICES. Environmental Protection Agency Contract EHS 70-102, Rept. 4134-71-72, APTD-1155, 260p., May 5, 1972. 6 refs.

NTIS: PB 210837

Mechanical valve gear analysis, feedpump design, rotary shaft seal evaluation, and fabrication of a ball matrix as an extended surface are discussed in detail as part of a program to design a Rankine power system for automobile propulsion. Engine bearing lubricant testing was conducted for a Rankine cycle reciprocating expander; steady-state and transient emission measurements were made for an automotive Rankine cycle burner. A transmission was developed which is a two-speed automatic design that uses a hydraulically- controlled slip clutch to permit the expander to idle at zero vehicle speed. A detailed program plan was developed.

26249 **APTIC NO. 48353**

National Aeronautics and Space Administration, Greenbelt, Md., Goddard Space Flight Center

ENVIRONMENTAL IMPACT STATEMENT FOR THE GODDARD SPACE FLIGHT CENTER. ELR 1673, 61p., Jan. 21, 1972.

NTIS: PB 206049-F

An environmental impact statement was prepared for the Goddard Space Flight Center that is involved in scientific research in space with automated satellites, research and development of meteorological and communication satellites, and tracking and data acquisition operations for manned and unmanned satellites. The principal environmental impact of the Center has been its stimulation of urban growth with the related direct and secondary effects. Further growth at the Center will be

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limited, but the surrounding community should continue to develop at a rapid pace. Adverse effects in daily operations are limited to unavoidable consumption of fuel, power, and other resources and the disposal of waste products. The location, topography, geology, meteorology, landscaping and wildlife habitat, monitoring, and daily operations of the center are defined. (Author summary modified)

26250 **APTIC NO. 48356**

Federal Aviation Administration, Kansas City, Mo., Central Region

FINAL ENVIRONMENTAL IMPACT STATEMENT. FALLS CITY MUNICIPAL AIRPORT, FALLS CITY, NEBRASKA. 28p., March 14, 1972.

NTIS: PB 204665-F

An environmental impact statement was prepared for the municipal airport in Falls City, Nebraska to determine the effects on the surrounding area of proposed improvements and expansion. The impact on the community as a whole; effects with respect to noise, aesthetics, natural environment, air and water pollution potential; alternatives to the project and short-term effects versus long-term benefits were examined. The major adverse effects were directly related to air and noise pollution. Based on annual air pollution data for present conditions, the projected annual loading for operations by 1982 was estimated at 1210 lbs of particulates, 11,200 lbs of sulfur oxides, 67,200 lbs of carbon monoxide, 2240 lbs of hydrocarbons, 1120 lbs of nitrogen oxides, and 560 lbs of aldehydes.

26251 **APTIC NO. 48357**

Federal Aviation Administration, Atlanta, Ga., Southern Region

FINAL ENVIRONMENTAL IMPACT STATEMENT. LINCOLNTON-CHERRYVILLE AIRPORT, LINCOLNTON-CHERRYVILLE, NORTH CAROLINA. 37p., Jan. 25, 1972.

NTIS: PB 204024-F

An environmental impact statement was prepared for the proposed airport at Lincolnton-Cherryville, North Carolina to determine the effects on the surrounding area of airport construction and projected operation. The impact on the community as a whole; effects with respect to noise, aesthetics, natural environment, air and water pollution potential; alternatives to the project; and short-term effects versus long-term benefits were examined. The only identifiable adverse environmental effect was defined as aircraft noise. Short-term increases in air and water pollution, specifically during construction, would be kept to a minimum by dust control and other measures. Air pollution resulting from engine exhaust was characterized as negligible.

26252 **APTIC NO. 48359**

Army Engineer District, Buffalo, N. Y.

FINAL ENVIRONMENTAL STATEMENT. OSWEGO STEAM STATION -- UNIT 5. NIAGARA MOHAWK POWER CORPORATION. 220p., Feb. 17, 1972. 43 refs.

NTIS: PB 204155-F

An environmental impact statement was prepared for a power plant to determine the effect on the surrounding area of a proposed additional oil-fired steam electric generating unit. The topography, geology, hydrology, meteorology, and complete environmental setting of the site were examined, and the projected effects of the proposed unit with respect to air and water pollution potential, noise, sanitary and chemical waste disposal, fuel oil handling, construction, aesthetics, and monitoring programs were studied. Alternatives to the project, short-term effects versus long-term benefits, and public and government involvement were also considered. The major adverse environmental effects included heat discharges, emission of air pollutants, and liquid effluents, noise increase, and fuel oil handling and consumption. Total emissions of sulfur dioxide, particulates, and nitrogen oxides, correlated with meteorological parameters and air quality standards, are estimated.

26253 **APTIC NO. 48457**

Office of Air Programs, Research Triangle Park, N. C., Air Pollution Technical Information Center

AIR POLLUTION ASPECTS OF EMISSION SOURCES: BOILERS - A BIBLIOGRAPHY WITH ABSTRACTS. Pub-105, 129p., May 1972.

A bibliography is presented of available literature on air pollution aspects of emissions from boilers. Categories include: emission sources, control methods, measurement methods, air quality measurements, atmospheric interaction, basic science and technology, effects on human health, effects on plants and livestock, effects on materials, economic aspects, standards and criteria, legal and administrative aspects, social aspects, and general. Author and subject indexes are provided.

26254 **APTIC NO. 48458**

Office of Air Programs, Research Triangle Park, N. C., Air Pollution Technical Information Center

AIR POLLUTION ASPECTS OF EMISSION SOURCES: IRON AND STEEL MILLS - A BIBLIOGRAPHY WITH ABSTRACTS. Pub-107, 88p., May 1972.

GPO

A bibliography is presented of available literature on air pollution aspects of emissions from iron and steel mills. Categories covered include: emission sources, control methods, measurement methods, air quality measurements, basic science and technology, effects on human health, effects on materials, economic effects, standards and criteria, legal and administrative aspects, and social aspects. An author and subject indexes are included.

26255 **APTIC NO. 48443**

Artemyev, N. I., D. A. Krylov, and Ye. A. Samkov

USE OF NATURAL GAS IN REVERBERATORY SMELTING FURNACES. (Primeneniye prirodnogo gaza dlya otrazhatelnoy plavki). Text in Russian. Gaz. Prom., 16(6):37-38, June 1972. 4 refs.

The use of natural gas for reverberatory furnaces is demonstrated by two examples. Preliminary internal mixing of natural gas with air is applied at one furnace, where the gas, under a pressure of 0.7-1 atm, is blown through bores in the burner nozzle, perpendicularly to the air flow which is put into rotary motion by blades. External mixing is adopted for another furnace where the natural gas is admitted at high speed at a pressure of 1.5-3 atm into the cylindrical nozzle with air flow in a tangential direction. Thus, spiraling flow at the end of the nozzle is obtained. Multiple correlation analyses revealed no superiority of natural gas-mazout combustion over natural gas regarding smelting and extraction capacity.

26256 **APTIC NO. 47938**

Ashihara, Kazunori, Matsuo Kodaka, and Juichi Takizawa

STUDY ON AUTOMOBILE FUEL AND QUANTITY OF EXHAUST GAS (1ST REPORT) - ON QUANTITY OF AROMATIC CONTENTS IN FUEL AND COMPOSITION OF EXHAUST GAS. (Jidosha no nenryo to haishutsugasuryo no kenkyo (Dai Ippon) - Nenryochu no aromatikku ganyuryo to haishutsu gasu sosei ni tsuite). Text in Japanese. Preprint, Ministry of Transportation (Japan), Traffic Safety and Nuisance Research Inst., p. 56-67, 1972. 5 refs. (Presented at the Traffic Safety and Nuisance Research Institute, Research Meeting 2nd, Tokyo, Japan, Nov. 8, 1972.)

This study was made to clarify correlation between the quantity of aromatics contained in the fuel and the compostion of the exhaust gas. Using a gasoline test engine, carbon monoxide, carbon dioxide, hydrocarbons, nitric oxide, and nitrogen dioxide were measured when the fuel contained aromatics of 60, 45, 30 and 15 vol%. Engine factors including water temperature, oil temperature, fuel flow quantity, air flow quantity, ignition timing, shaft torque, engine revolution, dynamo revolution, throttle valve opening, intake pressure, and exhaust gas temperature were examined. A non-dispersive infrared analyzer was used for analysis of NO and HC, a non-dispersive ultraviolet analyzer for NO2, and a flame ionization analyzer for HC. The effect of aromatic content in the fuel on CO, HC and NOx emissions was the same through all modes of driving. Increased aromatic content caused no increase in CO emissions except on occasions of high-load driving. The NOx emissions clearly increased with increased aromatic content, the increase ranging from 20% to 50%. The HC emission decreased.

26257 **APTIC NO. 48439**

Baudry, J., J. C. Guibet, J. Weissmann, and A. Duval

SOME RESULTS CONCERNING THE EFFECT OF LEAD REMOVAL FROM FUELS ON THE BEHAVIOR OF AUTOMOBILE ENGINES. (Quelques resultats concernant l incidence de la suppression du plomb des carburants sur le comportement des moteurs d automobiles). Text in French. Rev. Inst. Franc. Petrole Ann. Combust. Liquides (Paris), 27(5):785-805, Sept.-Oct. 1972. 9 refs. (Presented at the International Fisita Congress, 14th, London, England, June 25-30, 1972.)

The effects of leaded versus unleaded gasoline on the behavior of automobile engines were studied on 17 cars in a test stand and under road conditions. The increases in the octane requirements and the mean values at the end of testing were generally higher for leaded than for unleaded gasoline, with a difference not exceeding 2.4 points. Chamber deposits from leaded gasoline caused slightly greater loss in power (1.4%) and in efficiency (2.1%) than deposits from unleaded gasoline. There appears to be no clear-cut and systematic influence of the deposit on pollutant emissions. Dynamometer test stand measurements revealed an increase of about 20% in nitrogen oxide emissions due to deposits in the combustion chamber. Field measurements failed to reveal noteworthy differences in the emissions from leaded and unleaded gasoline-fueled engines.

26258 **APTIC NO. 47924**

Beedgen, Otto

HEATING FACILITIES AND BURNERS FOR CLEARING PLANTS. (Heizangseinrichtungen und Brenner fuer Klaeranlagen). Text in German. Sanit. Heizungstech., 37(11):809-814, Nov. 1972.

Problems of heating facilities and oil and gas burners for waste water treatment plants are discussed. To allow for changes in atmospheric conditions and in the gas pressure in the case of gas burners, a minimum air excess coefficient of 10% is required. The flue gas carbon dioxide content should be increased as much as possible, while the carbon monoxide content in undiluted flue gas should not be lower than 0.1%.

26259 **APTIC NO. 48001**

Bender, Rene J.

TROUBLE-FREE RECOVERY BOILERS COMING UP. Power, 116(10):35-36, Oct. 1972.

Recovery boilers are gas turbines which use heat exchange to recover and reuse the heat contained in turbine exhaust gases. The waste heat can be substantial, as the exhaust temperature may range from 750 to 900 F. Some employ supplemental firing to maintain a steady steam flow, higher steam pressures, and higher temperatures, regardless of the quantity of heat available in the exhaust. In such systems, hot exhaust gases may be mixed with primary air for combustion of supplemental gas or oil. In systems using supplemental firing, nitrogen oxides can form, thus encouraging the use of straight heat recovery only. Dampers, silencers, steam drums, tube fins, and other boiler equipment must be correctly designed in order to give the most efficient boiler. When gas turbines burn heavy oil or when heavy oil is used as a supplemental fuel, soot blowers are needed to remove soot.

26260 **APTIC NO. 48168**

Brecht, Christoph

TECHNICAL PROBLEMS OF FUTURE GAS SUPPLY. (Technische Probleme der zukuenftigen Gasversorgung). Text in German. Gas Wasserfach, Gas Erdgas (Munich), 113(10):489-498, 1972. 5 refs. (Presented at the Conference of German Gas and Water Experts, Stuttgart, West Germany, May 17, 1972.)

The Federal Republic of Germany draws its supply of natural gas from sources in Germany and in the Netherlands. The natural gas from the Northwestern part of the country must be cleaned of considerable quantities of hydrogen sulfide, which sometimes reaches 10% by volume. The cleaning of the H2S-rich gases brought more technical difficulties than were originally anticipated. One major problem is the simultaneous removal of carbon dioxide so that the gas must be conditioned afterwards by adding inert gases. At full operation of all desulfurization plants, annually 625,000 tons of sulfur will be obtained. This is more than the present sulfur consumption of Germany. Due to the considerable quantities of sulfur obtained in other countries through fuel desulfurization, e.g., 1.7 million tons/a in Lacq and 2.75 million tons/a in Poland, sulfur fetches low prices on the market which hardly cover the cost for desulfurization. In the future the price of natural gas will rise because of the higher sulfur concentration found in the gas of all newly discovered resources. The transportation costs for the gas will also rise because of the larger distances that have to be covered and the greater technical difficulties.

26261 **APTIC NO. 48073**

Burke, Donald P. and Hugh Pylant

ENERGY CRISIS. PART 1: CRITICAL SHORTAGES OF ALL ENERGY SOURCES WILL KEEP CHEMICAL COMPANIES IN A BIND UNTIL 85. Chem. Week, 111(20):29-36, Sept. 20, 1972.

The United States is passing through an energy crisis and faces critical shortage of petroleum, natural gas, and coal. While energy consumption will increase by 4.2%/yr, domestic supplies are projected to grow at only 2.6%/yr. As a result, costs are going up. Oil, gas, coal, and power companies will have to invest over $374 billion in construction and exploration during 1970-85. The Federal Power Commission has regulated natural gas pricing, which has stimulated gas demand because of artificially low pricing, but curbed the incentive for exploration. Because of the environmental problem, low-sulfur coal and natural gas have been used, rather than more abundant high-sulfur coal. Environmental concerns have also blocked or delayed construction of refineries, the building of facilities to accommodate supertankers, off-shore drilling, and nuclear power generators. Oil refiners have hesitated to build new refineries until octane requirements and lead levels are finalized for the control of automotive emissions. If the demand for domestic oil grows at 4.2% a year, all oil reserves will be exhausted in 40 years. Oil shale and oil in tar sands represent an enormous untapped source of oil; to date, the costs to extract it have been prohibitive, but new methods and the increasing need for oil may allow these sources to be tapped. Domestic supplies of natural gas will be supplemented by substitute natural gas (SNG) and liquefied natural gas (LNG). Coal can be desulfurized by burning the coal and then removing sulfur dioxide from the stack gases (which costs 30-60% of the f.o.b. mine price of coal), solvent refining, and making SNG from coal (gasification). Nuclear reactors and nuclear fusion would be good energy sources but present problems of radiation, thermal pollution, or nuclear disaster. Solar energy is another potential energy source.

26262 **APTIC NO. 48186**

Butler, C. P. and E. F. Darley

FIRE DYNAMICS OF MODEL WOOD BUILDINGS. J. Fire Flammability, vol. 3:330-339, Oct. 1972. 5 refs.

Two model wood buildings were burned in a fire research facility to determine the burning rate, convective heat release rate, and emission rates of carbon dioxide, carbon monoxide, and total hydrocarbons. An energy balance was established between the burning rate as measured by the rate of weight loss and the convective heat release measured as increased sensible heat in the stack gases; approximately 65% of the total energy went into convective heat. Concentrations of CO2 established two distinct maxima: one near the time of maximum burning rate and a second weak maxima associated with wall collapse. Concentrations of CO also showed two distinct maxima: one near the time of flashover and one before the time of maximum burning rate. The air pollution potential, especially from hydrocarbons and particulate matter, was discussed. (Author abstract modified)

26263 **APTIC NO. 47873**

Castilho, P. del

LEAD IN GASOLINE, PROS AND CONS. (Lood in benzine, pro of contra). Text in Dutch. Chem Weekblad, 68(39):11-12, Sept. 1972. 18 refs.

The general problem of lead in gasoline is reviewed. The average lead content in the air is 1-2 micrograms cu m. Exhaust lead particles are usually smaller than 5 micron, with a major proportion even smaller than 0.5 micron. Exhaust lead particles may remain suspended in the air over one week to one month before deposition, which is mainly due to aggregation. Some 50% of the total lead intake is retained by the human organism in organs such as liver and bones, while the rest is eliminated either directly from the lung or with the urine. Though the lead intake from food and water usually constitutes a more serious hazard than that from the air, high lead concentrations in places with high traffic density warrant a ban on lead in such areas. The optional use of no-lead gasoline with a low compression ratio would increase the fuel consumption by about 10%. Lead-free gasoline is also essential for the feasibility of catalytic exhaust afterburning. To prevent the situation in Europe from further deteriorating, the gasoline lead content should be limited to 0.4 g/l.

26264 **APTIC NO. 48116**

Crowley, D. P., M. P. Brash, B. W. Burrell, F. L. Tempesta, and F. Niehaus

TEST METHOD FOR THE ANALYSIS OF TOXIC PRODUCTS FROM BURNING MATERIALS -- PHENOLIC FOAM. Fire Technol., 8(3):228-236, Aug. 1972. 4 refs. (Presented at the National Fire Protection Association, Annual Meeting, 76th, Philadelphia, Pa., May 17, 1972.)

The toxic products given off by organic materials exposed to a large fire cannot be realistically assessed by conventional laboratory techniques such as pyrolizing small or powdered samples in an oven pyrolysis chamber and analyzing the gases given off, because the high surface temperatures and large internal temperature gradients that these materials experience when exposed to a fire are not properly simulated in such a chamber. Toxic products evolved from burning phenolic foam were determined in an experimental fire simulation facility. The experimental set-up, specimen preparation, and test procedure are described. Analysis of the gases by infrared spectrophotometry, gas chromatography, mass spectrometry, and colorimetry revealed that carbon monoxide, hydrogen fluoride, hydrogen chloride, hydrogen cyanide, and phenol were evolved in small amounts. A method of extending these results to actual field situations, based on mass loss rates of the foam measured in the fire simulation facility is presented.

26265 **APTIC NO. 48276**

Davies, R. M. and B. Oeppen

PAPER 2. COMBUSTION AND HEAT TRANSFER IN NATURAL GAS FIRED FURNACES. J. Inst. Fuel, 45(377):383-390, July 1972. 8 refs.

Firing with natural gas and fuel oil in high-temperature industrial processes is compared on a thermodynamic basis and by means of a theoretical model for furnace heat transfer. The potential advantages of firing with luminous oil flames may be offset by operating at lower levels of excess air with natural gas. The use of advanced types of burners and furnaces in realizing the potential of a gaseous fuel is considered. The design and performance of self-recuperative burners are described, together with an outline of their areas of application. Various types of rapid heating furnaces for specific applications are discussed and details given of their performance. Natural gas can replace other fuels in established processes; gas firing techniques are available for metal reheating. (Author abstract)

26266 **APTIC NO. 47879**

Davis, J. B.

TWO POLLUTION--A CHALLENGE TO THE PAINT INDUSTRY. Paint Mfr., 42(9):10-11, 15, Sept. 1972.

Moves in the United Kingdom to combat nuisance problems from air pollution resulted in the Clean Air Acts of 1956 and 1968, and a recent Order under the Alkali Act brought the surface coating industry within its orbit for the first time by listing acrylate works and diisocyanate works as registrable under the Act. Potential pollution problems from industries that use organic finishes are mostly due to evaporating solvents and diluents and to by-products of baking finishes like acrolein and formaldehyde. Solvent vapors can be adsorbed by activated carbon or absorbed with a suitable liquid such as mineral oil. Direct flame and catalytic incineration are other possible control methods for organic emissions. There are six main types of water pollutants in the paint industry, some of which derive from emulsion paints, others which derive from solvent based products, and some which come from both types. A very effective control device is a good interceptor on the sewer line leaving the plant. This is basically a settling chamber that will do a reasonably good job of trapping suspended solids, heavy skins and sludges, solvents, and oils. Solid waste disposal is discussed, as well as noise pollution and toxicity dangers. Workers should be protected from infra sound, which is basically a low frequency consistent noise level which, while not as obtrusive as a loud noise, can cause drowsiness and fatigue. The paint industry uses lead, asbestos, mercury, and other materials with a known toxicity; increasing usage of polyurethanes and epoxies also brings into use new curing agents with irritant properties. Research into this area can take several forms covering products which do not pollute, application methods, alternative methods of resin curing, and methods of manufacture.

26267 **APTIC NO. 47874**

Dijkstra, F.

A SMALL-SIZE INCINERATOR. (Een kleine verbrandingsinstallatie). Text in Dutch. Polytech. Tijdschr. Ed. Procestechniek (The Hague), 27(2):717-723, Oct. 1972. (Presented at the Gaseous and Liquid Waste Incineration Symposium of the KIVI Section of Heat Engineering, Eindhoven, Netherlands, Feb. 28, 1972.)

A small-size incinerator for toxic and malodorous gaseous or liquid wastes with a capacity of 100,000 kcal/hr is described. The incinerator is composed of a waste storage tank, primary and secondary air supply, a 0.3 cu m combustion chamber, a catalytic afterburning chamber, a diluting fan, and a 30 m stack. The temperature in the incineration chamber can reach 1200 C, and the residence time of the waste being incinerated in this chamber varies from 0.5 to 4 sec. The chamber is equipped with a combined gas-fuel oil burner. The catalytic afterburning chamber contains a platinum catalyst bed with a capacity of 10,000 cu m/cu m/hr. The flue gas with a temperature of 400 C is diluted and cooled with air and discharged through a stack made of polyethylene. The rate of oxidation of hydrocyanic acid for example, is 99.98%.

26268 **APTIC NO. 48231**

Dotreppe-Grisard, N.

PLASTICS AND THE ENVIRONMENT. DISPOSAL OF DOMESTIC REFUSE. (Matieres plastiques et environnement. L elimination des ordures menageres). Text in French. Tribune CEBEDEAU (Centre Belge Etude Doc. Eaux), 25(341):190-197, April 1972. 18 refs.

Problems of solid waste disposal and waste incineration-related air pollution are described with regard to Belgium. Air pollution, including odorous emissions, and corrosion are the basic problems of waste incineration. Some 2% of the domestic waste in Belgium consists of plastics, including 1.75% of polyethylene, 0.30% of polystyrene, and 0.20% of polyvinyl chloride (PVC). While PVC is the only plastic material to give rise to hydrochloric acid emissions, such emissions are generated by other components of the domestic waste, such as paper and wood. Since a considerable part of the HCl formed during incineration is adsorbed by alkaline buildups and fly ash, the gaseous HCl emission is much less than the theoretical amount liberated. The formation of HCl may be due to mineral chlorides and silicates forming highly volatile iron and aluminum chlorides, and to reactions of alkaline chlorides with acid sulfates. Incinerator waste gas analyses performed in the U.S.A. revealed the following pollutant concentrations: 1-330 ppm of HCl, 0.6-1.1 ppm of hydrofluoric acid, up to 106 ppm of sulfur dioxide, 57-138 ppm of nitrogen oxides, up to 45 ppm of carbon monoxide, 25-58 ppm of aldehydes, and other hydrocarbon contents below 10 ppm. The dust concentrations in the flue gases may range from 300 to 1000 mg/N cu m, and can be effectively reduced by electrostatic precipitators to as low a value as 120 mg/N cu m. Gaseous pollutants require scrubbers for their removal. Odorous components can be removed best by afterburning, while methods such as adsorption on graphite and masking by other compounds are prohibitively expensive or unacceptable. The best method, however, is to maintain the combustion chamber temperature above 750 C. Corrosion hazards in incinerators can be lessened by maintaining the gas temperature in a range of 900-1000 C, flow rates of 6-8 m/sec, applying secondary air, and by minimizing changes in the flow direction.

26269 **APTIC NO. 48072**

Eickelpasch, Dieter

DUST NUISANCE AND DUST MEASURING METHODS IN THE STEEL INDUSTRY EXAMPLES OF REMEDIAL MEASURES. (Staubbelastung und Staubmessverfahren in der Stahlindustrie. Beispiele fuer Abhilfemassnahmen). Text in German. Stahl. Eisen. (Duesseldorf), 92(23):1174-1179, Nov. 1972.

The dust and fume emitted by oxygen lancing converters, Thomas converters, arc furnaces, and Siemens-Martin furnaces consist almost exclusively of iron oxides (hematite and magnetite). This emission is known as brown smoke. The grain size of brown smoke is extremely fine, between 0.01 and 0.1 micron. However, the respirable fraction is low so that brown smoke poses no danger to human health. There are other inert and toxic dusts in the steel industry, however, which are a hazard to humans. Numerous different dust sources render any gravimetric dust measurement quite difficult. A great number of samples at systematically distributed points must be taken in a short time, for which the konimeter is most suitable. With this method 2.5 or 5.0 cu cm air is drawn on and accelerated to between 140 and 160 m/sec. The dust particles impact on a layer of petroleum jelly through rapid deflection of the air flow. Particles with a diameter of less than 1 micron can still be measured. If the konimeter method is not applicable because of special operating conditions, models can be used for studying the situation. Application of this technique is explained for two examples, a barium chloride exhaust fan for an extrusion press and a lead vapor exhaust fan in a foundry pit. Model studies have particular importance for the planning of new plants because the operating conditions can be simulated on two and three-dimensional models and the important parameters can be varied. The dusts emitted by the Siemens-Martin furnace during charging and removal of dusts and slag from the flues, which becomes necessary every 100 days, are best drawn off into the tank of a truck. On the way to the tank the material is sprayed with water so that no dust is agitated upon dumping of the tank load into a disposal pit.

26270 **APTIC NO. 47923**

Feind, W.

NEW INSTALLATION RULES FOR LOW-PRESSURE GAS APPARATUSES. (Neue installationstechnische Regeln fuer Niederdruck-Gasanlagen). Text in German. Sanit. Heizungstech., 37(11):766-775, Nov. 1972.

New installation regulations for low-pressure gas apparatuses, especially those used in households, are described. While several gas apparatuses are allowed to be connected to a common chimney, units with capacities over 40,000 kcal/hr, as well as that equipped with blower burners without flow control should have separate chimneys. Gas apparatuses installed in non-ventilated rooms with an airspace exceeding 12 cu m may be operated over 10-15 min before a carbon monoxide concentration of 0.1% by volume is reached. The operation time can be increased to 25 min by ventilation.

26271 **APTIC NO. 48103**

Foster-Pegg, R. W.

TOTAL ENERGY OPPORTUNITIES OPEN TO POWER UTILITIES--PART I. Diesel Gas Turbine Progr., 38(12):34-36, Dec. 1972.

For many years industrial companies and electric utilities practiced Total Energy (TE) by generation of power in back pressure or extraction steam turbines with exhaust steam supplying heat to the process. The climate is again favorable for on-site power generation because of air pollution regulations requiring the use of more costly fuels. In industrial operations, steam turbines reject a considerable amount of heat relative to their power output or, if condensing, are costly and of low efficiency. Gas turbines are more suitable for industrial TE applications. They recover the sensible heat and use moderate additional firing of fuel in the exhaust to adjust the heat output. This low-cost system provides an equivalent heat rate of 6000 Btu/kwh at a heat recovery of 9000 Btu/kwh. Diesel and gas engines are suitable for small installations where heat can be used at low temperature and the ratio of heat to power is low. Their equivalent heat rate is about 5000 Btu/kwh at a heat recovery of 5000 Btu/kwh. Electric utility ownership of TE plants may provide the most economical match of power generation and plant heat requirements. Under utility sponsorship, several TE plants in a city could be interconnected for highly efficient TE generation.

26272 **APTIC NO. 48006**

Geffken, Claude

NEW GENERATION INKS. COSTS. Am. Ink Maker, 9(50):30, 64, 65, Sept. 1972. 1 ref. (Presented at the National Association of Printing Ink Manufacturers, Annual Convention, 58th, Colorado Springs, Colo., June 1972.)

New inks have been developed to solve ecologic problems such as solvent emission, solvent toxicity, effluent or sewage restrictions, food packaging restrictions, and general safety and health. The two main types of new inks are low viscosity inks containing water as the main solvent to eliminate toxic volatile solvents and high viscosity inks which require high levels of energy for drying and which reduce high boiling hydrocarbon solvent emissions. Low viscosity inks include water flexo, water gravure, and packaging gravure inks. High viscosity inks include oxidative inks overprinted by fast drying-clear coat, microwave, thermal catalytic, and ultraviolet inks. Hourly cost comparisons are given for ultraviolet versus heatset inks.

26273 **APTIC NO. 47864**

Glebov, V. P., G. I. Motin, I. Ya. Sigal, M. L. Sokolov, I. A. Fedyunin, and S. S. Nizhnik

NITROGEN OXIDES OCCURRING IN EMISSIONS RESULTING FROM CYCLONE AND BURNER COMBUSTION OF HIGH SULFUR MAZUT. (Okisly azota v dymovykh gazakh pri tsiklonnom i gorelochonom szhiganii vsokosernistogo mazuta). Text in Russian. Teploenergetika, no. 10:5-7, Oct. 1972. 5 refs.

Cyclone and burner combustion of high-sulfur mazut (black oil) are compared with regard to nitrogen oxide emissions. The nitrogen oxide concentrations in the combustion products, expressed as nitrogen dioxide, were in the ranges of 0.83-0.95 g/cu m and 0.75-0.93 g/cu m for cyclone and burner combustion, respectively, with the excess air coefficient in the range of 1.00-1.06. When the average excess air coefficient in the combustion chamber was increased to 1.04 by means of vortex burners, the nitrogen oxide concentrations in the flue gas were largely the same as for cyclone combustion at an excess air coefficient of 1.00 which is due to the increased likelihood of maintaining small excess air coefficients in cyclone boilers compared with burner-equipped ones. The ground-level nitrogen oxide concentrations at a power plant of 2400 MW and with a 250-meter stack accounted for 0.50% and 0.45% of the maximum allowable concentration for cyclone and burner combustion, respectively.

26274 **APTIC NO. 48107**

Golding, Ivor L. S.

GAS ATMOSPHERE GENERATORS. Ind. Process Heat., 12(10):22-24, Oct. 1972.

Recent developments and trends in the design and function of gas atmosphere generators are reviewed. Compactness and rapid start-up has been achieved in exothermic generators by greatly increasing heat release rates. Nozzle mix systems or venturi-type carburetors stop explosive fuel gas-air mixtures from passing into the furnace in case of flame failure. Exothermic gas is dried to an acceptable dew point by secondary gas cooling or compression drying. On small installations carbon dioxide in exothermic gas is removed by passage through molecular sieve-filled towers; on larger installations monoethanolamine is used for CO2 removal. Work on endothermic generators has concentrated on catalysts with 2.5-7.5% nickel. These catalysts reduce the tendency of soot formation in the furnace and yield a gas with low residual hydrocarbon. Other new developments are integrated processes, where the heat produced in an exothermic plant is used to impart heat to the process furnace or to produce other atmospheres. An autothermic generator produces gas infinitely variable from endo to lean exo.

26275 **APTIC NO. 48150**

Golothan, D. W.

AIR POLLUTION FROM DIESEL ENGINES AND GAS TURBINES IN ROAD TRANSPORTATION. Ingenieur, 84(43):A927-A933, Oct. 27, 1972. 1 ref.

The relationship between fuel properties and exhaust emissions from diesel engines is reviewed. Exhaust gas composition, the properties of white and black smoke, the formation of nitrogen oxides, carbon monoxide, and hydrocarbons, the effects of cetane number and fuel volatility on smoke emissions, and control regulations for diesel emissions are examined. The potential of smoke suppressants, anti-smoke additives, and alternate fuels for smoke emission control is discussed. Gas turbine emissions are also considered.

26276 **APTIC NO. 48248**

Gradischnik, Helmut K.

AIR POLLUTION DUE TO HEATING SYSTEMS IN GRAZ. DOCUMENTATION - MEASURES TO COMBAT IT - COSTS. (Heizungsbedingte Luftverunreinigungen in Graz. Dokumentation - Gegenmassnahmen - Kosten). Text in German. Umweltschutz-Staedtereinig. (Vienna), 9(9):202-206, 1972.

The consumption of various kinds of fuels (hard coal, soft coal, coke, light fuel oil, extra light fuel oil, city gas, remote heat, and electricity) for heating purposes was determined for the city of Graz. These data were used as basis for the calculation of the extent of sulfur dioxide and trioxide emissions from heating systems. An annual total SO2 emission of 5092 tons was obtained which includes emissions from industrial heating systems and remote heating plants. Of this total, 58.5% came from home heating systems and 26% from industrial and commercial heating systems. Of the emissions from home heating, more than 80% came from burning solid fuel. The seasonal SO2 characteristics also shows the heating systems as the major source for the SO2 emission. For a long-term solution of the SO2 emission problem from heating systems, only the replacement by low waste gas producing heating systems will help. Since this cannot be achieved over the period of a few years, a realistic 10-year plan was been worked out for the city. About 24-30 million dollars will be needed over the period. The public will have to appropriate between 2.8 and 16 million dollars to promote the installation of low waste gas heating systems.

26277 **APTIC NO. 48296**

Grey, D. C. and M. L. Jensen

BACTERIOGENIC SULFUR IN AIR POLLUTION. Science, 177(4054): 1099-1100, Sept. 22, 1972. 6 refs.

On a yearly basis, copper smelters are the dominant source of atmospheric sulfur compounds in and near Salt Lake City, Utah. Isotopic studies suggested that the next most important source is bacteriogenic sulfur released by anaerobes from river-bottom muds and marshes near Great Salt Lake. Bacteriogenic sulfur amounts to about 10,000 t/yr, or 10% of sulfur released annually by smelters. On a seasonal basis, the bacteriogenic source of sulfur may rival or exceed smelter contributions.

26278 **APTIC NO. 48129**

Grimmer, G., J. Jacob, and A. Hildebrandt

HYDROCARBONS IN HUMAN ENVIRONMENT. PART IX. CONTENT OF POLYCYCLIC HYDROCARBONS IN ICELAND SOIL. (Kohlenwasserstoffe in der Umgebung des Menschen. 9. Mitteilung: Der Gehalt polycyclischer Kohlenwasserstoffe in islaendischen Bodenproben). Text in German. Z. Krebsforsch., 78(1):65-72, 1972. 38 refs.

The relationship of the natural background concentration of polycyclic hydrocarbons in the soil to those caused by emissions was determined. The samples were taken in Iceland, and island which is hardly industrialized. The sole emission source was the domestic heaters. The samples were taken far from any traffic. The detection limit of the analytical method (ultraviolet spectrometry or fluorescence measurements) for all polycyclic hydrocarbons was below 0.4 micrograms/kg, for benzo(a)pyrene 0.02 micrograms/kg. Part of the samples taken at different points on the Island contained no detectable quantities of hydrocarbons. This was true for both the surface soil samples as well as the underground soil samples. Lava beds contained no measurable quantities of polycyclic hydrocarbons, humus contained a small quantity of several polycyclic hydrocarbons. Pollution of the humus samples by emissions cannot be ruled out since the surface soil samples contained higher concentrations than the underground samples taken at a depth of 30 cm. Higher concentrations of polycyclic hydrocarbons were found in the samples taken near the landing strip for propeller airplanes on the Island Heimay. The ratio of benzo(a)pyrene/benzo(ghi)perylene/ coronen of 1 to 2 to 0.8 was comparable to that found in combustion engines. The soil samples from the airport at Reykjavik were highly polluted by polycyclic hydrocarbons.

26279 **APTIC NO. 48289**

Hoegg, Ulrich R.

CIGARETTE SMOKE IN CLOSED SPACES. Environ. Health Perspect., no. 2:117-128, Oct. 1972. 39 refs.

Sidestream smoke carbon monoxide concentrations in a 25 cu m test chamber were measured and compared with mainstream smoke CO concentrations. A smoke machine that held up to 24 cigarettes smoked cigarettes to a 23 mm butt. The highest CO concentration in the test chamber was 69.8 generated by the sidestream of 24 cigarettes. The sidestream of a single cigarette contained 75.5 ml CO, while the mainstream of the same type of cigarette contained 16.0 ml CO. Mainstream smoke contained 36.2 mg total particulate matter (TPM) per cigarette, while total sidestream smoke contained 25.8 mg TPM per cigarette. The majority of sidestream smoke particles were 0.7 micron and therefore fully respirable. There was no measurable loss of CO from the test chamber 3 hr after the cigarettes were smoked, but particulate matter of sidestream smoke dissipated at a rapid rate. Formulas for calculating the room constituents of cigarette smoke are given; they permit a comparison between air quality standards and smoky indoor atmospheres.

26280 **APTIC NO. 48120**

Hoekstra, Enno

UTILIZATION OF GAS TURBINES FOR BASE LOAD AND PEAKING IN POWER DISTRIBUTION SYSTEMS. (Utilisation des turbines a gaz pour les besoins de base et les pointes dans la distribution d energie electrique). Text in French. Entropie, no. 45:37-43, May-June 1972. 1 ref.

Important details to be observed in the overall economic evaluation of utility systems expansions are explained. The use of simple, regenerative, and combined cycle gas turbine plants with their unique characteristics of reduced installation time, flexibility of size, siting and operation are described with regard to an optimized mixed pattern generation expansion. The versatility of gas turbine power plants in unit sizes of 20, 50, and 70 mw, individually or in multiple power blocks, or in combined cycle ratings of 32, 165, 330, and 450 MW can help any utility in a number of ways to achieve the lowest possible total system cost. A combination of nuclear power plant designed for base load with a set of combined cycle gas turbines constitutes an economic means of increasing the capacity of and of creating an instantaneously available power source, especially for large-capacity distribution systems. It is possible to increase the capacity of power plants that use fossil fuels by the use of gas turbines for reheating feed water or for operation in fully combined cycle. STAG-F blocks apply supplemental firing for the gas turbine exhaust before the exhaust heat recovery boiler. The gas turbine operates at an air excess ratio of 300-400%. Natural gas, distillates, or oil residues can be used for the supplemental firing.

26281 **APTIC NO. 47955**

Ikegami, Jun

COMBUSTION IN DIESEL ENGINE, AND NITROGEN OXIDES. (Diizeru kikan no nensho to chisso ankabutsu). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 11(131):101-108, Nov. 1972. 28 refs.

Various experimental and theoretical studies are cited to explain the nitrogen oxides formation mechanism in automotive engines. The NOx are chemically formed from nitrogen and oxygen under high temperatures. The factors affecting generation of NOx are temperature, oxygen concentration, and remaining time. Where the temperature is higher, the chemical equilibrium temperature is also higher and the formation velocity is also greater, which means more NOx with higher temperature. The temperature plays an even greater part where oxygen is present. Formation of NOx is restrained with little oxygen even if the temperature is high. Formation of NOx is slower compared with the combustion reaction, so that generation of NOx can be quantitatively restrained if the combustion time is short. In a diesel engine, the combustion temperature is again a dominant factor affecting NOx formation. Especially important is the temperature in the earlier and middle stages of the combustion. Several attempts have been made to establish the temperature index that can represent the NOx generation of a diesel engine, but no satisfactory solution has been found as yet. Studies on a direct injection-type engine are introduced. The revolution speed and compression ratio are important parameters for NOx generation in this type of engine, but the problem is more complex than that. For example, when the revolution speed is higher, the calorific value per unit time in the engine increases to result in higher temperature level of cycle, thus leading to an NOx increase. On the other hand, the cooling speed of the gas due to expansion will be greater with the increased revolution speed, thus working in favor of reduced NOx. These two contradicting factors plus many others are involved in the NOx emission. A double cell-type engine is also reviewed for NOx emissions. This type is better than the former in NOx emissions.

26282 **APTIC NO. 48293**

Knox, Arthur C.

AIR POLLUTION FROM COMBUSTION EQUIPMENT AND FUELS. Combustion, 44(3):11-12, Nov. 1972.

The total emission potential (pounds of pollution/million Btu) of coal-, oil-, and gas-fired combustion equipment is compared on a chart. Another chart shows the extent to which total emissions from existing combustion equipment can be reduced by current control equipment. These charts have practical value as guides for establishing control programs for any size combustion system. Any further reduction in total emissions must come from improved fuels or combustion in an atmosphere other than air. Controlled emissions for sulfur-free fuels fired in existing combustion equipment and controlled emissions for firing with pure oxygen in future combustion equipment are also charted.

26283 **APTIC NO. 47944**

Kobayakawa, Takashi

COMBUSTION AND EXHAUST GAS OF ENGINE. (Enjin no nensho to haigasu). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Kansai Branch, p. 37-46, 1972. (Presented at the Japan Society of Mechanical Engineers, Kansai Branch, Lecture Meeting, 17th, Osaka, Japan, Dec. 5-6, 1972.)

Air pollution by automobile exhaust gas is reviewed from various angles. Aldehydes polycyclic hydrocarbons will be subject to emission contol in the future in addition to carbon monoxide, nitrogen oxides, and hydrocarbons. The CO emission is to be controlled in 1973 on basis of the CO g/km value measured under the new 10-mode driving pattern instead of the CO concentration. The CVS (Constant Volume Sampling) method should be used for analysis of the exhaust gas by 1973. While the present control criteria for CO, HC and NOx are 13-29 g/km, 2.0-4.5 g/km, and 2.2-4.0 g/km, respectively, the 1975 goals are set at 2.1 g/km or lower for CO, 0.25 g/km or lower for HC and 1.2 g/km or lower for NOx. By 1976, NOx emission will have to be further reduced to 0.25 g/km or lower. Exhaust gas characteristics of various engines including four-cycle and two-cycle gasoline engines, rotary engines, diesel engines, and external combustion engines are discussed. Control measures for CO, HC and NOx emissions are listed. They include the exhaust gas recirculation, water injection, the jet ignition engine, the Schlomann engine, the IFP engine, the PROCO engine, and the CVCC engine. Also briefly touched on are several types of exhaust gas cleaners including the catalyst type, thermal reactor type, and afterburner type.

26284 **APTIC NO. 48436**

Kropp, R.

PETROLEUM AND THE ENVIRONMENT. (Petrole et environnement). Text in French. Tech. Moderne, 64(11):28-29, Nov. 1972.

Environmental hazards involved in handling and use of petroleum products are reviewed. Carbon monoxide and unburned residues are a result of incomplete combustion of hydrocarbons; it is possible to reach over 80% combustion efficiency by homogenous air-fuel mixtures. Sulfur dioxide emissions can be reduced by magnesia or ammonia injection. Internal combustion engines powered by hydrocarbons emit CO, unburned residues, nitric oxide, nitrogen dioxide, and aldehydes. Technological improvements such as carburetor and ignition timing adjustments have resulted in a decrease by 50% in the CO emissions over the last decade. Exhaust control by catalytic or direct afterburning, or by the use of turbines instead of conventional internal combustion engines are being studied. Spent oil, including spent lubricants, can be incinerated in waste incinerators.

26285 **APTIC NO. 48084**

Maugh, Thomas H. II

GASIFICATION: A REDISCOVERED SOURCE OF CLEAN FUEL. Science, 178(4056):44-45, Oct. 6, 1972.

Because of non-polluting properties of natural gas, domestic consumption rose to 22.7 trillion scf in 1971, an increase of 73% over 1961. This demand has pushed natural gas producers and distributors to the limits of their capacity, causing the introduction of synthetic natural gas (SNG) from the gasification of coal or fuel oil. Naphtha can be converted into 95-98% methane, the principal constituent of natural gas, by the Catalytic Rich Gas, Methane Rich Gas, and Gasynthan methods. However, the shortage of naphtha (most is imported into the U. S.) makes this a stopgap measure. The U. S. has massive reserves of coal, much of which contain high quantities of sulfur. Coal can be gasified into sulfur-free SNG containing 50% hydrogen and carbon monoxide and 50% methane, but it can only be economically useful in some applications, and thus cannot totally replace natural gas. Coal gasification processes include Lurgi, Hygas, Carbon Dioxide Acceptor, Bi-Gas, and Synthane.

26286 **APTIC NO. 48128**

Moesta, Hasso

HEATING, COOLING THROUGH THE SUN AND SPACE. (Heizen, Kuehlen durch Sonne und Weltraum). Text in German. Umwelt (Duesseldorf), 2(6):53-58, Dec. 1972.

The use of solar energy for heating and power production requires a heat storer, a thermal rectifier, and a surface receiving the solar energy or transmitting infrared radiation into space. For heat storage, crystalline compounds are used for the development of suitable materials for various temperatures. The functioning of the heat rectifier plate (in this case used for air conditioning buildings) is briefly explained. The bottom side of the rectifier plate forms the room ceiling, the other side of the plate the roof. A heat storer with a temperature of 17 C for example, receives the excessive heat from the room below. This heat is passed to a fluid-soaked layer. Due to the low boiling point the fluid will start to evaporate. The steam will condensate underneath the roof-side as soon as the temperature of this side drops below 17 C. The condensate is collected and returned to the fluid-soaked layer. The heat transport occurs in one direction only, namely from the building to the roof; any heat transport from outside into the building is blocked. A similar system is used for room heating. The possibility of super black surfaces for solar power plants and non-polluting drives for automobiles are discussed. Apart from the energy storer the drive is not much different from the Rankine engine. Instead of a boiler it uses film evaporation, instead of stationary condensers and ventilators it uses circulating heat exchangers, and instead of an adjustable burner it has a combustion chamber. At full load the entire energy is passed to the evaporator; at partial load operation part of the energy is used for charging the storer which assumes the energy supply during part of the driving time. This hybrid drive has the advantage of having no exhaust gas for part of the driving time.

26287 **APTIC NO. 48239**

Moesta, Hasso

ROOM HEATING AND AIR CONDITIONING WITH NON-POLLUTING TYPES OF ENERGY. (Raumheizung und Klimatisierung mit umweltfreundlichen Energiearten). Text in German. Heizung-Lueftung-Haustech., 23(11):363-369, Nov. 1972.

The principle of using solar energy for room heating, cooling, and power production is discussed. In sunny areas, to which the major part of the continental mass belongs, the flow of solar energy amounts to about 1200 kWh/sq km/yr with the reflection and absorption by clouds taken into consideration. The roof area per capita of the population is estimated to amount to 20 sq m without Africa, India, and China. The solar energy over an area of this size amounts to 24,000 kWh/capita/yr. The same roof area could radiate about 3.5 to 8.5 million kcal of heat into space during the night without warming up either the air or water bodies. For room cooling, rectifier plates could be installed on the roof with a heat storage layer facing the room. The thickness of the heat storer is determined by the desired degree of cooling and cooling period which in turn depend on the insulation of the building and the meteorological conditions. The thermal rectifier plates are analogous to the electric rectifiers passing the heat flow in one direction only while tightly insulating it in the other direction. The same principle applies for heating with the heat flow in the opposite direction. Solar power plants comprise the same equipment as conventional power plants with the exception of the solar energy collectors and latent storers. The solar power plants operate on the principle of the radiation law which states that energy can be more efficiently withdrawn from solar radiation by an absorber surface which is as cool as possible. The physically black object absorbs 100%. Super black objects permit a high operating temperature and a more favorable thermodynamic degree of efficiency than nuclear power plants.

26288 **APTIC NO. 48366**

Mohr, C. Michael, Raymond W. Moore, Adel F. Sarofim, Anne N. Dimitriou, Richard Kronauer, James I. Stevens, and Frank B. Tatom

INCINERATOR OVERFIRE MIXING STUDY. Little (Arthur D.), Inc., Cambridge, Mass, Massachusetts Inst. of Tech., Cambridge, Dept. of Chemical Engineering, Harvard Univ., Cambridge, Mass., and Georgia Inst. of Tech., Atlanta, Ga., Office of Air Programs Contract EHSD 71-6, Rept. ADL-72940, APTD-1133, 250p., Feb. 1972. 376 refs.

NTIS: PB 210382

Incineration of solid waste can be a significant source of air pollution. Combustible air pollutants such as carbon monoxide, soot or char, and hydrocarbons are emitted from incinerator furnaces as a consequence of poor combustion. Since these pollutants are removed from the exit gases with difficulty, improving combustion is an attractive approach for improved pollutant emission control. The processes occurring in a burning refuse bed are analyzed to yield estimates for the rate and quantity of combustibles emitted from the bed. Gases of over 14% carbon monoxide content can be released. Methods are developed to analyze the flow through the furnace. The analysis shows that stratification of the flow and incomplete mixing of fuel and sufficient oxygen-containing gases can occur. Design equations are presented describing the behavior of overfire air or steam jets for mixing, tempering, and/or bringing oxygen to the combustible gases. Refuse incinerator overfire air system design methods developed from the above analyses are presented and contrasted with similar design methods for solid fuel bed coal-firing furnaces. (Author abstract modified)

26289 **APTIC NO. 48094**

Moon, John F.

EUROPEAN PROGRESS WITH STIRLING ENGINES. Diesel Gas Turbine Progr., 38(12):14-17, Dec. 1972.

In Sweden, prototype displacer-type Stirling engines have been tested on buses, cabin cruisers, and submarines. Some of the engines are double-acting with one piston per cylinder; this piston acts as displacer and power piston. Other engines are single acting, with displacer and power pistons controlled by a rhombic drive mechanisms. Exhaust emissions of a bus with a 200 hp single-acting engine were measured according to the California 13-mode test. Carbon monoxide emissions were 2.3 g/hp/hr; nitrogen oxides were 2.0 g/hp/hr; and hydrocarbons were 0.05 g/hp/hr. The noise level of another Stirling-powered bus was under 80 dB(A) at a distance of 7.5 m. A compact new double-acting engine weighs only 125 kg and has only 10 moving parts in the drive mechanisms. These prototype engines have been running on diesel fuel, but almost any combustible liquid could be used. They can also be adapted to heat supply from a previously charged heat-storage system.

26290 **APTIC NO. 48371**

Morgenstern, Paul, Josette C. Goldish, and Ronald G. Orner

AIR POLLUTANT EMISSION INVENTORY FOR THE STATE OF NEW HAMPSHIRE. (SUMMARY REPORT). Walden Research Corp., Cambridge, Mass., New Hampshire Air Pollution Control Agency and Air Pollution Control Control Office Contract 68-02-0049, APTD-1342, 46p., Jan. 1972. 24 refs.

NTIS: PB 212606

Air pollutant emission data were collected in New Hampshire. The contaminants included sulfur oxides, carbon monoxide, nitrogen oxides, hydrocarbons, and particulates. The methodology of the inventory, survey area and grid coordinate system, emission factors, and fuel parameters are examined. The emission sources included fuel combustion in residential, commercial, and industrial areas, steam electric power plants, process losses, solid waste disposal through incineration or open burning, and transportation. Complete data are presented for 1970.

26291 **APTIC NO. 47890**

Otori, Yasunobu

DEVELOPING COMPETITION FROM LOW-POLLUTION ENGINES. (Teikogai enjin no kaihatsu kyoso). Text in Japanese. Kinzoku (Metals) (Tokyo), 42(17):51-56, Nov. 1972.

Regulations for carbon monoxide, hydrocarbons, and nitrogen oxides from car exhaust, which are comparable with U. S. laws will be enforced in Japan by 1975 and 1976. They give an impetus to the development of the low-pollution engines. A new rotary engine car was provided with a non-polluting system which is operated comprehensively by an electronic control system. The exhaust gas from the rotary engine contains 0.17 g/mi HC and 2.2 g/mi CO, much below the required values. A Compound Vortex Controlled Combustion engine (CVCC) was developed which passes the Japanese and American exhaust regulations. The CVCC engine has received attention from each country because it is a piston engine. Rotary and CVCC engines will compete in the future. Gas turbine-electric hybrid engines are also being developed.

26292 **APTIC NO. 48279**

Pitt, R. S.

STEELMAKING AT PORT KEMBLA. Iron Steel, 45(5):527-534, 535-540, Oct. 1972.

The Port Kembla steelworkers in Australia are discussed. The development of the steel industry in Australia, the growth of steel consumption, and the layout of the plants are reviewed. The steelworks complex consists of sinter plants, coke oven batteries, blast furnaces, open hearth and electric steelmaking shops, an ingot mould foundry, plate an/ hot strip mills, and a steel strapping line. The operation and cooling of the furnaces is described. A tar and naphthalene recovery plant, gas cleaning systems including dust catchers and wet scrubbers for the furnaces, rolling and finishing services, plate finishing and tinplate production, and personnel training are reviewed. The Port Kembla Works are in the process of expansion, having already increased the steelmaking capacity by the addition of new blast furnaces, a basic oxygen plant, and rolling and finishing services. Costs of installing the new facilities are reviewed.

26293 **APTIC NO. 48252**

Porstendoerfer, Justin and Alfred Schraub

CONCENTRATION AND AVERAGE PARTICLE SIZE OF PRIMARY AND SECONDARY CIGARETTE SMOKE. (Konzentration und mittlere Teilchengroesse des Haupt- und Nebenstromrauches der Zigarette). Text in German. Staub, Reinhaltung Luft, 32(10):409-412, Oct. 1972. 12 refs.

Cigarette smoke produced by a smoking machine was investigated with regard to particle size and particulate concentration dependent on the number and volume of the puffs. The median radius of the smoke particles was determined indirectly by measuring the velocity of attachment of the radioactive radon(22) decay products to the smoke particles. Concentration measurements with an automatic condensation counter were applied to smoke of the main and side streams. The smoke was diluted with filtered air and passed into an aerosol chamber where it was inhaled by humans. The particle retention in the lung was calculated from the particle concentration measured in the inhaled and expirated cigarette smoke. In the primary smoke, 3.5 to 7.0 times 10 to the 8th power particles/cu cm were measured, in the secondary flow 5.6 to 6.3 times 10 to the 9th power/sec. In both cases the particle diameter was on the 0.12 micron size. A degree of retention of 15 to 20% was calculated, based on an inhalation frequency of 20 inhalations/min, an inhalation volume of 600 to 700 cu cm, and allowing 1 sec for inhalation. Through the humidity in the lung, the particles enlarged by a factor 1.5 to 1.6. The particles of cigarette smoke did not fall into the range of readily retained particles according to Landahl s lung retention model.

26294 **APTIC NO. 47881**

Ranson, J. B.

REAL-TIME OXYGEN MEASUREMENT FOR COMBUSTION CONTROL. Control Instrumentation, 4(8):46-47, Sept. 1972.

The most widely used method for indication of combustion efficiency today is the measurement of oxygen concentration in the flue gas. Too little oxygen leads to inefficient combustion, creating excess carbon monoxide and unburned carbon. This corresponds to a waste of fuel and can produce smoke and soot pollutants. Conversely, too high a level of oxygen corresponds to a consequential loss of heat escaping up the flue stack. Modern desired operating levels for optimum efficiency and automatic closed-loop control are discussed. Those features desirable in an oxygen analyzer suitable for real-time measurement and control are listed. Using solid-state technology and employing no moving parts, a probe-type oxygen analyzer which does not require a sampling system is described. The heart of the analyzer is a stabilized zirconium cell which, when heated and controlled at a constant temperature of 850 C, generates a voltage which varies logarithmically, and is inversely proportional to the difference in the oxygen partial pressures of the flue gas and the reference air cell. Design principles of the instrument are listed, as well as cost justification for closed loop control.

26295 **APTIC NO. 48229**

Rigamonti, R.

CONSIDERATIONS ABOUT POLLUTION PROBLEMS. (Considerazioni sul problema dell inquinamento). Text in Italian. Riv. Ital. Sostanze Grasse, 49(7):310-314, July 1972.

The emission of sulfur into the environment from man-made works from 1965 to 1967 was 77 million t/yr of which 94% was sulfur dioxide and 6% hydrogen sulfide, and from natural sources to 143 million t/yr of which 48% was H_2S liberated by soil-bound biological processes, 21% by marine biological processes, and 31% from sea spray. Man emitted about half as much sulfur into the atmosphere as nature with 70% coming from combustion of coal, 20% from combustion of oil, and the balance from other sources. Nitrogen oxides emitted principally by automobiles, amounted to 53 million t/yr compared with 823 million t/yr generated by natural sources (electrical discharges during storms). Carbon monoxide emission amounted to 304 million t/yr of which 64% came from gasoline while only 33 million t/yr were emitted from natural sources (forest fires). Hydrocarbons amounted to 88 million t/yr, 50% of which was the result of incomplete combustion of hydrocarbons, compared with 2600 million t/yr from natural sources (methane, terpenes). The danger of man-made pollutants is that their emission sites are restricted to comparatively small areas with 95% emitted in the northern hemisphere. Given its low solubility in water, carbon dioxide remains in the atmosphere where it has reached a concentration of 320 ppm, which is annually increasing by an average of 0.7 ppm. While the limit of tolerance for man if about 10 times that, the steady increase represents a dangerous trend because of effects on the climate because CO_2 absorbs infrared radiation. This serious unresolved problem calls for extensive studies.

26296 **APTIC NO. 48304**

Rosnay, Joe de

POLLUTION FROM SULFUR AND ITS REMEDIES. (La pollution par le soufre et ses remedes). Text in French. Recherche, 3(27):884-886, Oct. 1972.

The origin and distribution of sulfurous pollutants in the atmosphere, and methods for the simulation and measurement of emissions are reviewed. Ninety five percent of the anthropogenic sulfurous pollutant load, estimated at 150 million tons yearly, is in the form of sulfur dioxide, mostly from the combustion of fossil fuels. More than 93% of the total sulfurous pollutant load is in the Northern hemisphere. Hydrogen sulfide, formed mainly from the decomposition of organic matter, may oxidize to SO_2 in the presence of nascent oxygen or ozone. Sulfur dioxide may form sulfur trioxide with molecular oxygen on the action of ultraviolet light. Ten percent of the sulfate content in the oceans is transferred to the continents by winds and clouds. The respective residence times of H_2S, SO_2, and sulfates in the atmosphere before washout are 7, 0.5-6, and 7 days, respectively. Concentration levels can be approximately predicted by means of hydraulic or mathematical models. A monitoring network of 31 stations in the Rotterdam region is connected with a computer to determine mean values and tendencies of the automatically measured SO_2 concentrations. The arrangement of the individual stations was determined from a mathematical model in such a manner that eight stations are always on the weather side with respect to the major emission sources, irrespective of the actual wind direction. This network will be extended to comprise a total of 250 stations in 1973.

26297 **APTIC NO. 48301**

Saito, Takeshi

FUEL COMPOSITION AND EXHAUST GAS OF SPARK IGNITION ENGINE. (Hibana tenka enjin no nenryo sosei to haiki). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 11(131):157-168, Nov. 1972. 18 refs.

Generally, composition of fuel has very little to do with that of the exhaust gas of a spark ignition engine. It is estimated that proportion of pollutants that can be removed by changing the composition of fuel amounts to only several percent of the total pollutant emission. Analysis of the fuel composition in relation to the exhaust gas must be made rather as a means to help clarify the complex combustion process in the engine for which there is much to be done. Composition of petroleum fuel has little effect on the carbon monoxide and nitrogen oxide concentration of the exhaust gas. To study the relation between the fuel composition and the hydrocarbon emission, a four-cycle engine was operated with several kinds of liquefied gas fuels including methane, propane, butane, propylene, and a propane butane mixture. Using a flame ionization detector, the total HC (wt ppm) in relation to the excess air ratio was measured. The total HC value was lowest at the ratio of 1.2-1.3 for each fuel. The difference between kinds of fuel was comparatively small in the thicker side of the air/fuel ratio, but the HC value increased proportionately for heavier fuels in the lean side. With propylene, HC emission was least since the combustion temperature was highest as indicated by the highest NOx emission. The proportion of the reaction components in the HC exhaust, that is, the proportion of fuel that has been converted to HC through some reactions, was highest at the excess air ratio of 1.1-1.2. The no-reaction component proportion was 50-60% with propane and butane and 90-95% or the highest with methane, indicating methane is most advantageous from a viewpoint of pollution prevention. Other topics included photochemical reaction versus fuel composition and exhaust gas composition versus non-leaded fuel.

26298 **APTIC NO. 48237**

Schade, Horst and Fritz Baum

FORECAST FOR THE AIR POLLUTION BY COMBUSTION GASES FROM STATIONARY COMBUSTION SYSTEMS IN THE STATE OF NORTH RHINE WESTPHALIA UNTIL 1980. (Prognose der Luftverunreinigung durch Verbrennungsabgase aus stationaeren Feuerungsanlagen im Lande Nordrhein-Westfalen bis 1980). Text in German. Gesundh. Ingr., 93(11):321-329, 1972. 12 refs.

The forecast of the emission of solid matter such as soot, ash particles, unburned fuel components (tar and tar derivatives), and sulfur dioxide by stationary firing systems in North Rhine Westphalia until 1980 is based on emission data of the year 1969 and on the consumption data of hard coal, soft coal, fuel oil, and gas. The prospective emission quantities were calculated for the years 1970, 1972, 1975, and 1980 and listed separately for the various kinds of fuel and consumers such as power plants, industrial combustion systems, and domestic heaters. Hard coal-fired systems produce the major part of the solid emission. In the year 1969 such firing systems constituted 70%. This percentage will drop until 1980 to 52%. As a consequence the emission of solid matter which amounted to 538,000 tons in the year 1969 will go down to 450,000 tons by 1980. The hard coal fired systems will be mostly replaced by oil-fired ones. For soft coal, an increase of the SO_2 emission over this period will be apparent. The emission of SO_2 will rise from 1.48 million tons in 1969 to about 2.11 million tons in 1980. The solid emission will be reduced by only 16% while the SO2 emission will rise by 42% by 1980. For a reduction of the emission of solid matter, the substitution of smoke-producing coal by briquettes, the improvement of dust collection methods, and the increased use of fuel oil seem to viable methods. Fuel and waste gases can be desulfurized to eliminate SO2 emissions. Since low-sulfur fuel oil is available in West Germany to some extent it will be advisable to use this oil in power plants which cannot afford waste gas desulfurization. The sulfur-rich fuel oil can be used in those plants which are big enough to justify waste gas desulfurization.

26299 **APTIC NO. 48323**

Schlicht, B.

GAS PREPARATION PLANTS. (Gasaufbereitungsanlagen). Text in German. Chem. Tech. (Berlin), 24(8):521-522, Aug. 1972.

For gas transport between the preparation point and the consumer, an expensive pipeline system is necessary which must be protected against corrosion by a suitable preparation of gas. The most important methods of gas preparation are drying and desulfurization. The methods particularly suitable for drying of the gases such as low temperature condensation, adsorption, and absorption are reviewed. An economic method is the simultaneous drying and removal of hydrogen sulfide with a mixture of ethanol amine, diethylene glycol and water. A high substance exchange is achieved by high gas velocities, large exchange areas, and the application of the cross-over countercurrent principle for flow direction. The design of a glycol/amine plant does not essentially differ from a conventional gas drying plant. With carbon dioxide-free gases, a desulfurization degree between 97 and 99.3% can be achieved at a simultaneous decrease of the dew point of about 30 deg. The absorbent losses amount to between 1.5 and 3.0 kg/100,000 cu m, referred to a water-free glycol/amine mixture. Since 1967, 49 gas treatment plants based on this method with capacities between 50,000 and 2.4 million cu m/day at operating pressures of 10 to 160 kg force/sq cm were built.

26300 **APTIC NO. 47883**

Taft, R. T.

THE FIRST TWELVE MONTHS OPERATION OF A TOTALLY GAS-FIRED CUPOLA. Brit. Foundryman, 65(9):321-328, Sept. 1972. (Presented at the Institute of British Foundrymen, Annual Conference, Eastbourne, England, June 1972.)

The program of development leading up to the conversion of a production cupola to gas firing is briefly outlined. Design of the gas cupola is discussed, as well as the actual conversion and operation. Properties of the iron from the gas cupola and the essential qualities of the gas cupola itself are indicated. Refractory wear inside the furnace was much less than in a coke cupola. In addition, there was no visible emission and no visible smoke plume. Since melting was under reducing conditions, there were no brown fumes resulting from an excess of iron oxides, although there were some iron oxides in the gases emitted. Various problems and experiences in operating the gas cupola over the first twelve months operation are examined. The cost of conversion and the operating cost are considered. The gas cupola has a place in the foundry industry for its present and future melting requirements. (Author abstract modified)

26301 **APTIC NO. 48285**

Tsuji, Masahito, Toshihide Okuno, and Kokei Takata

INVESTIGATION OF THE COMPONENTS OF BAD ODOR FROM FISH MEAL FACTORIES. (Gyo-chokotsu kaseijo yori hasseisuru akushu seibun chosa). Text in Japanese. Hyogo-ken Kogai Kenkyusho Kenkyu Hokoku (Rept. Public Nuisance Res. Inst., Hyogo Prefect.), no. 3: 18-20, 1972. 3 refs.

The main components of bad odor emitted from fish meal factories were examined. Samples were taken from the exhausts of rotary dryers into vacuum jars. Samples were also taken at 20 m, 120 m, 180 m, and 300 m from the factories. The samples were analyzed by gas chromatography after low temperature concentration. The components from factory A were 0.28 ppm of monomethylamine and dimethylamine, 0.63 ppm of diethylamine, a trace of acetaldehyde, 0.44 ppm of n-propylamine, a trace of hydrogen sulfide, and a trace of ammonia. The components of the odor from Factory B were similar; but there were four kinds of aldehydes. The reason was probably the oxidation of amine by ozone which is used in the deodorization system of this factory. The environmental concentration in the surrounding areas of these factories contained very little odor concentration (from several ppb to several tens of ppb), yet the odor was clearly detectable. Seasonal differences in detectability were also noted.

26302 **APTIC NO. 48416**

Weisburd, Melvin I.

INSPECTION PROCEDURES FOR SPECIFIC SOURCES. In: Field Operations and Enforcement Manual for Air Pollution Control. Volume III: Inspection Procedures for Specific Industries. Pacific Environmental Services, Inc., Santa Monica, Calif., Office of Air Programs Contract CPA 70-122, Rept. APTD-1102, p. 7.1.1, G.1-G.31, Aug. 1972.

Major metallurgical, chemical processing, mining, and other industries which contribute to the full range of air pollution, including smoke, fumes, dust, odor, gases, and vapors, are described in this report. Each stationary source section is broken down according to nature of source, process description, emissions, controls, and inspection points. A glossary is included.

26303 **APTIC NO. 48123**

Wolff, Hans Christian

METHANOL NO IMMEDIATE LEAD SUBSTITUTE FOR GASOLINES. (Methanol kurzfristig kein Benzin-Bleiersatz). Text in German. Umwelt (Duesseldorf), 2(6):62-63, 1972.

Experiments on an engine dynamometer with a lead-free fuel with a research octane number of 92 and an engine octane number of 82 yielded the following results: with a methanol (methyl alcohol), addition of 10% the research octane number rose by 3.5 units, with 20% methanol by about five units. Less favorable results were obtained with the engine octane number which rose by only two units upon addition of 10% methanol and by four units upon addition of 20% methanol. In the last few years particularly the engine octane number gained importance for high power engines. Since the addition of methanol affects primarily the engine octane number in a negative way, something which can be avoided only by considerable engine design modifications, it is no immediate lead substitute. Even if all new engines were designed from now on for the operation with methanol as a fuel additive, there would be only about 30% of engines by 1976 which would operate with methanol while all old models (70%) would require the standard gasoline quantity. A less drastic lead reduction in the gasoline quantity. A less drastic lead reduction in the gasoline than demanded in the Federal Republic of Germany until 1976 seems to be a better solution for the time being, and more in line with the regulations in other countries, such as France, and England where the lead content shall be gradually reduced to 0.45 g/l until the end of 1975.

26304 **APTIC NO. 48363**

Wolsko, T. D., M. T. Matthies, and R. E. Wendell

TRANSPORTATION AIR POLLUTANT EMISSIONS HANDBOOK. Argonne National Lab., Ill., Center for Environmental Studies and Argonne National Lab., Ill., Applied Mathematics Div., Illinois Inst. for Environmental

Quality Subcontract 31-109-38-2517, 187p., July 1972. 8 refs.

NTIS: ANL/ES-15

A procedure is described to quantify the air pollutant emissions (carbon monoxide, hydrocarbons, and nitrogen oxides) from transportation sources with the aid of background information, emission data, computer program descriptions, and manual calculation procedures. A brief background on air pollution sources from transportation vehicles is given. Emission factors for light-duty, heavy-duty, and diesel vehicles are discussed, as well as speed adjustments to emission factors. Two computer programs that can be used to calculate emissions are the TREFACT, which calculates emission factors for widely varying vehicle characteristics and transportation system operation, and the TREMISS, which uses regional transportation simulation data to calculate emissions for large transportation networks. Manual emission calculation procedures designed to provide a simple method of calculating air pollutant emissions from roadways are illustrated. A fairly complete set of emission factors is tabulated so that transportation emissions can be calculated without using either of the computer programs. (Author abstract modified)

26305 **APTIC NO. 48324**

Yamamoto, Tokutaro

A-W TYPE PLASTICS INCINERATOR. (A-W gata purachikku shokyaku sochi). Text in Japanese. Kagaku Kojo (Chem. Factory), 16(7): 37-41, July 1972.

A newly designed plastics incinerator can dispose of plastics, rubber tires, waste oils, waste oil sludges, and other high-molecular industrial wastes. Called the A-W type plastics incineration system, it incinerates the plastics and other wastes for complete disposal and perfectly treats the emission gases. Wastes are carried into the feeder hopper by a conveyor and stored there for the time being. These wastes are fed into the furnace by means of the rotary feeder provided at the bottom of the hopper. The wastes fed onto the hearth are continuously moved by the scraper moving on the hearth, and pyrolyzed by the high-temperature radiation heat from the furnace wall and combustion gas. The gas then starts burning. The unburned gases are mixed with secondary combustion air blown in from the hearth and furnace walls and finally burned at 900-1200 C in the second and third combustion chambers. The hearth is a pan-shaped type designed to prevent molten plastics from clogging the fire grates. Two burners are used, one in the primary combustion chamber and another in the secondary. The combustion exhaust gas is led into the cooling tower and cooled with spray water to 100 C or less. The gas is then led into the scrubber tower where it is sucked into the stack by a blower. The system has high combustion efficiency and high efficiency for removal of harmful gases. Hydrogen chloride gas and sulfur dioxide measured 4550 ppm each at the exit of the furnace, and were only 8.4 ppm and a trace at the exit of the scrubbing tower.

26306 **APTIC NO. 49069**

Yamate, Noboru

AIR POLLUTION BY NITROGEN OXIDES AND PROBLEMS OF COUNTERMEASURE. (Chisso sankabutsu ni yoru taiki osen to boshi taisaku e no kadai). Text in Japanese. Kankyo Sozo (Environ. Creation), 2(10):1-5, Oct. 1972. 12 refs.

A review of major emission sources of nitrogen oxides along Tokyo Bay shows that 38.9% of the total emission comes from thermal electirc power plants (455.5 tons/day), followed by automobiles which emit 360.0 tons/day or (30.7%). Manufacturing industries emit 284.1 tons/day (24.2%); petroleum refining industry emits 38.7 tons/day; commercial and domestic sources emit 23.3 tons/day altogether; incinerators create 9.4 tons/day; and airplanes emit 0.7 tons/day. Among these sources, the damages by automobiles are most serious to human health, since the human respiratory systems is reached most readily. Both nitric oxide and nitrogen dioxide above Tokyo s main highways rose drastically between 1968 and 1969. The highest point was reached in 1970, and 1971 measurements showed a slight drop. The 1971 daily averages for NO2 ranged from 0.013 to 0.165 ppm, NO ranged from 0.019 to 0.432 ppm. The overall NO2 average was 0.053 ppm, and NO average was 0.128 ppm at three monitoring locations in Tokyo. The 1970 NOx data collected at various air pollution monitoring stations in all of Japan show that the average NO2 concentration was highest in Kawasaki (0.053 ppm), followed by Sapporo (0.043 ppm), and Osaka (0.043 ppm). The highest NO average was in Osaka (0.057 ppm), followed by Kawasaki (0.053 ppm), and Sapporo (0.051 ppm). The NOx emission control methods for automobiles, boilers, and chemical industries are briefly reviewed.

26307 **APTIC NO. 48216**

Yoshinaga, Katsuya

ON EXAMPLES OF CHANGES TO CITY GAS OF INDUSTRIAL FUELS - FROM HEAVY OIL, HEAVY OIL-FUELED BOILER, ELECTRICITY, ETC. (Kogyoyo nenryo to shite no toshigasu eno tenkan rei ni tsuite - Juyu, juyudaki boira, denki nado yorino tenkan rei). Text in Japanese. Preprint, Japan Heat Management Assoc., Tokyo, p. 9-23, 1972. (Presented at the Conference of Japan Heat Management Association, 13th, Tokyo, Japan, Oct. 18-20, 1972, Paper 2.)

Although use of heavy oil as an industrial fuel is widely taken for granted as economically most advantageous due to its low cost in terms of fuel expense, it is not so in a number of industrial applications such as heating, drying, and metal melting when high costs for installation, operation, and maintenance of a heavy oil boiler and steam pipelines is taken into consideration. Another disadvantage is the low thermal efficiency due to great heat loss caused by the pipelines. Several cases where city gas was used as an industrial fuel instead of heavy oil are presented to demonstrate how the city gas is advantageous over the heavy oil fuel. The first example is the drying process during painting and printing using methanol or toluene as a solvent where a direct gas burner is used. This kind of drying process utilizes hot air produced by an electric heater or a heat exchanger with the steam. With city gas as the fuel, the new drying furnace is automatically operated to give the hot air temperature of 90 C. Since it is easy and free to control the heating temperature with the city gas whose turndown ratio is 1 to 40 or higher, only the necessary amount of heating is added from time to time to hold the temperature at a fixed level, thus yielding 100% thermal efficiency. This is generally 60% at most and often 40% or even lower when a heavy oil boiler is used for the same purpose. When the city gas is used for metal melting in a crucible furnace the thermal efficiency is 32.5%, instead of 10-14% with kerosine. The metal loss is greatly reduced by the use of city gas, and more than offsets the higher fuel cost. Cost comparison between steam heating and city gas heating is made at some length.

1971

26308 **APTIC NO. 47959**

Bundesministerium des Inneren, Bonn (West Germany), Projekt gruppe Umweltchemikalien und biozide

CONTRIBUTION OF THE ENVIRONMENTAL CHEMICALS AND PESTICIDES PROJECT GROUP. (Beitrag der Projektgruppe Umweltchemikalien und Biozide). Text in German. In: Materialien zum Umweltprogramm der Bundesregierung 1971. Umweltplanung. Lower House of Parliament, 6th Session, Document 6/2710, p. 65-107, Oct. 1971.

Environmental aspects of the use of fertilizers, pesticides, and other environmental chemicals, and of exhaust lead emissions are reviewed. The amount of automobile-generated lead emissions in West Germany is estimated at 7000 t/yr in 1970. The lead concentrations in the air in places with high traffic density ranges from 0.5 to 15 micrograms/cu m, against a background concentration of 0.03-0.1 micrograms/cu m. The sedimentation rate of lead ranged from 0.18 to 4.8 mg/sq m/day in the 1967-1968 period. Correlation between the lead concentrations in plants and their distance from highways was determined. The maximum allowable workplace lead concentrations are 0.200 mg/cu m for metallic lead, 0.015 mg/cu m for lead arsenate, and 0.75 mg/cu m for both lead tetraethyl and lead tetramethyl. Emissions of nitrogen dioxide, sulfur dioxide, fluorine, pesticides, mercury, cadmium, fuel additives, and other pollutants are discussed.

26309 **APTIC NO. 47960**

Bundesministerium des Inneren, Bonn (West Germany), Projektgruppe Reinhaltung der Luft

CONTRIBUTION OF THE CLEAN AIR MAINTENANCE PROJECT GROUP. (Beitrag der Projektgruppe Reinhaltung der Luft). Text in German. In: Materialien zum Umweltprogramm der Bundesregierung 1971. Umweltplanung. Lower House of Parliament, 6th Session, Document 6/2710, p. 201-221, Oct. 1971.

General problems and objectives concerning air pollution abatement in West Germany are reviewed. The carbon monoxide, dust, sulfur dioxide, nitrogen oxide and hydrocarbon emissions in 1969 were 8, 4, 4, 2 and 2 million tons, respectively. The exhaust CO emissions are expected to rise despite strict standards to be imposed in 1971. A reduction of the gasoline lead content from 0.44 to 0.15 mg/l will result in a decrease of 50% in the exhaust lead emissions. The dust emission will decrease by 50% by 1980, and so will the power plant-generated SO2 emissions. Nitrogen oxides and odorous emissions are, however, expected to rise. While it is possible to limit industrial dust emission concentrations to 150 mg/N cu m, the abatement of nitrogen oxide emissions requires intensified research. The use of low-sulfur fuel and of long-distance heating constitute the basic means of controlling SO2 emissions.

26310 **APTIC NO. 47961**

Bundesministerium des Inneren, Bonn (West Germany), Projektgruppe Umweltfreundliche Technik (Verfahren und Produkte)

CONTRIBUTION OF THE ENVIRONMENTAL PROMOTION TECHNOLOGY (PROCEDURES AND PRODUCTS) PROJECT GROUP. (Beitrag der Projektgruppe Umweltfreundliche Technik (Verfahren und Produkte)). Text in German. In: Materialien zum Umweltprogramm der Bundesregierung 1971. Umweltplanung. Lower House of Parliament, 6th Session, Document 6/2710, p. 335-356, Oct. 1971.

The significance of technologies with minimum environmental hazard is outlined. The environmental protection-related expenditures in power engineering, chemistry, mining, and mineral processing in 1969 were 37, 55, 70, and 25 million dollars, respectively. Flue gas desulfurization, with an efficiency of 80%, and heavy oil desulfurization are in the stage of pilot studies. It will be possible to reduce harmful emissions from spark-ignition engines by 30% in three years, and by 99% in 8-10 years. The nitrogen oxide and hydrocarbon emissions from diesel engines will decrease by 30-50% during the same period.

26311 **APTIC NO. 47962**

Bundesministerium des Inneren, Bonn (West Germany), Arbeitsgruppe Montanindustrie

CONTRIBUTION OF THE MINING INDUSTRY PROJECT GROUP. (Beitrag der Arbeitsgruppe Montanindustrie). Text in German. In: Materialien zum Umweltprogramm der Bundesregierung 1971. Umweltplanung. Lower House of Parliament, 6th Session, Document 6-2710, p. 357-394, Oct. 1971. 17 refs.

Environmental protection-related problems and objectives in the mining industry are outlined. The potassium salt industry has invested 6 million dollars for the control of sulfur dioxide and dust emissions over the last 10 years. Coke gases from brown coal coking are partly desulfurized to a residual hydrogen sulfide content of 2 g/cu m and to an organic sulfur content of 0.5 g/cu m. The afterburning of carbon monoxide by auxiliary air, and the partial replacement of coke by natural gas or oil in cupola furnaces are among the emission control possibilities of practical interest. The decreasing proportion of open-hearth furnaces in the iron and steel industry is of a beneficial effect regarding emissions. A three-stage steel manufacturing process now under study, which consists of agglomeration, direct reduction, and electric smelting, will also reduce emissions. Dry absorbents are best for binding fluorine emissions from nonferrous metallurgical plants where the SO2 emitted should be converted into marketable sulfur instead of into sulfuric acid. Electrostatic dust precipitators, tissue filters, and venturi scrubbers are used for dust separation in the ferroalloy industry.

26312 **APTIC NO. 47963**

Bundesministerium des Inneren, Bonn (West Germany), Arbeitsgruppe Chemische Industrie

CONTRIBUTION OF THE CHEMICAL INDUSTRY PROJECT GROUP. (Beitrag der Arbeitsgruppe Chemische Industrie). Text in German. In: Materialien zum Umweltprogramm der Bundesregierung 1971. Umweltplanung. Lower House of Parliament, 6th Session, Document 6/2710, p. 395-461, Oct. 1971.

Environmental protection-related problems and objectives in the chemical industry of West Germany are reviewed. The total sulfur dioxide, nitrogen oxide, carbon monoxide, chlorine, hydrochloric acid, fluorine compound, hydrocarbon, and dust emission concentrations in 1969 were 60,000, 25,000, 50,000, less than 100, 1000, 200, 100,000, and 10,000 tons, respectively. Qualitative and quantitative determination methods and emission standards for various pollutants, and means of pollution control (such as cyclones, electrostatic dust precipitators, tissue filters, scrubbers, fiber filters, and thermal, catalytic, and wet incinerators) are reviewed. Problems and projects in pollution control area in various branches of the chemical industry (inorganic raw materials, petroleum and natural gas, organic intermediaries, organic paints, monomers, pesticides, pharmaceutical products, detergents, pulp and paper, leather, textiles, starch, sugar, and beer) are outlined.

26313 **APTIC NO. 47965**

Bundesministerium des Inneren, Bonn (West Germany), Arbeitsgruppe Glas, Keramik, Steine und Erden

CONTRIBUTION OF THE GLASS, CERAMICS, STONE AND EARTH WORKING GROUP. (Beitrag der Arbeitsgruppe Glas, Keramik, Steine und Erden). Text in German. In: Materialien zum Umweltprogramm der Bundesregierung 1971. Umweltplanung. Lower House of Parliament, 6th Session, Document 6/2710, p. 509-520, Oct. 1971. 5 refs.

Problems and efforts in the glass, ceramics, stone, and earth industries in the environmental protection area are outlined. The contribution by this branch of industry to pollutant emissions in 1969 was 70,000 tons of particulate matter, 50,000 tons of sulfur dioxide, and 200 tons of gaseous fluorine compounds. The specific dust emission from cement works is about 0.11% of the cement output, compared to 3.5% in 1950. While it is possible to limit dust emission concentrations to 150 mg/N cu m by means of electrostatic and mechanical dust separators, there are no economically acceptable solutions to the SO2 and F emission problems. The extensive use of low-sulfur fuel for glass smelting has a positive effect regarding SO2 emissions.

26314 **APTIC NO. 47966**

Bundesministerium des Inneren, Bonn (West Germany), Arbeitsgruppe Energie

CONTRIBUTION OF THE ENERGY WORKING GROUP. (Beitrag der Arbeitsgruppe Energie). Text in German. In: Materialien zum Umweltschutzprogramm der Bundesregierung 1971. Umweltplanung. Lower House of Parliament, 6th Session, Document 6/2710, p. 521-547, Oct. 1971.

General environmental problems of energy production are reviewed. Thermal power plants emit varying amounts of dust, sulfur dioxide, nitrogen oxides, carbon monoxide, hydrocarbons, fluorine, and chlorine compounds which, unlike nuclear power plant emissions, will continue to create acute environmental problems. The efficiency of electrostatic dust precipitators has increased from 90 to 99.8% during the last 10 years. Flue gas desulfurization, with an efficiency of 80%, entails specific investments in the range of 5-13 dollars/KWh, and an increase of 1 cent/kWh in the cost of electricity. Future research and development will focus on diffusion mechanisms, the effects of various pollutant concentrations, heat, and vapor on living organisms and on the atmosphere, waste heat utilization, fine dust separation techniques, fuel and flue gas desulfurization processes, wet and dry cooling towers, and possibilities to reduce radioactive emissions.

26315 **APTIC NO. 48086**

Hawaiian Sugar Planters Assoc., Honolulu, Experiment Station

ENVIRONMENTAL QUALITY. In: HSPA Experiment Station 1971 Annual Report. p. 67-68, 1971.

The environmental research program of the Hawaiian Sugar Planters Association has been devoted almost entirely to determining if air and water quality standards are valid and realistic, if the standards can be met and if so how and at what cost. Nephelometer and hi-vol measurements of cane-fire smoke were made and analyzed to estimate total particulate emissions; Hawaii's 1971 air standards for particulates were not exceeded. An atomic absorption spectrometer was used to measure chromium and mercury in waste waters and silica in cane fire smoke. The effects of processing unburned cane on harvesting, hauling, and factory operations were compared with burned cane. Processing unburned cane would increase the costs of cane harvesting and hauling operations and decrease factory production rates, particularly at low-rainfall plantations. Sugar yield/acre might be improved slightly, but sugar refinability would generally be much poorer. Metals and pesticides in waste water were analyzed.

26316 **APTIC NO. 48339**

Dept. of Commerce, Washington, D. C., Advisory Board Panel on Automotive Fuels and Air Pollution

AUTOMOTIVE FUELS AND AIR POLLUTION. (FINAL REPORT). 36p., March 1971. 2 refs.

GPO

The effects of fuel composition on the amount and nature of atmospheric pollutants emitted from automotive vehicles were examined, including effects on auto manufacturers and petroleum industries, associated costs, effects on emission control devices, and other sources of pollution which might emerge when exhaust emissions are controlled. Gasoline composition, including lead additives, aromatic content, polynuclear hydrocarbons, and detergents, was investigated. Emission control technology includes thermal exhaust gas reactors, exhaust gas recirculation systems, catalytic devices, evaporative emission control, and particulate control. The major automotive emissions are carbon monoxide, unburned hydrocarbons, and nitrogen oxides.

26317 **APTIC NO. 48341**

Coordinating Research Council, Inc., New York, NO and CO Sub- Panel

EFFECT OF HUMIDITY OF AIR INTAKE ON NITRIC OXIDE FORMATION IN DIESEL EXHAUST. CRC Proj. CAPI-1-64, 1-5, Rept. 447, 21p., Dec. 1971. 7 refs.

NTIS: PB 206733

The effect of humidity of the inlet air on the formation of nitric oxide in engine exhaust was investigated using data from both gasoline and diesel engines. A total of 7 different correction factors for adjusting NO measurements are examined. The experimental procedures and mathematical calculations are reviewed.

26318 **APTIC NO. 48380**

Blackard, Wayne A.

AIR POLLUTION REPORT – FEDERAL FACILITIES. METROPOLITAN MEMPHIS INTERSTATE AIR QUALITY CONTROL REGION. Air Pollution Control Office, Rockville, Md., Federal Sources Branch, APTD-1302. 19p., May 1971. 7 refs.

NTIS: PB 211905

The Metropolitan Memphis Air Quality Control Region incorporates portions of Arkansas, Mississippi, and Tennessee. There are 52 Federal facilities in the area; 17 are involved in fossil fuel (gas, oil, coal) or refuse combustion (open burning and incineration). The installations emit annually 104 tons of carbon monoxide, 54 tons of nitrogen oxides, 38 tons of sulfur oxides, 18 tons of particulates, and 2 tons of hydrocarbons, thus contributing slightly less than 1% of the total particulates and SOx from all stationary sources within the area. Identifiable annual Federal aircraft emissions are estimated at 10,000 tons CO, 2000 tons of hydrocarbons, 600 tons NOx, and 200 tons of particulates. Total annual fuel usage and abatement plans are mentioned. (Author summary modified)

26319 **APTIC NO. 48330**

Diamant, W.

PARAMETERS AFFECTING THE ABATEMENT OF BURNER-EMITTED POLLUTANTS. (FINAL REPORT). (Parametres agissant sur la limitation des polluants emis dans les appareils de combustion). Text in French. Societe Generale de Fonderie, Aubervilliers (France), Service des Recherches, Delegation Generale a la Recherche Scientifique et Technique Contract 69-01-761, 31p., Dec. 1971.

Parameters affecting the pollutant emissions from a conventional, oil-firing burner-boiler assembly were studied by investigating the fuel pulverization using a rotating-mirror microscope. At a given pulverization pressure (13.5 bars) and practically constant fuel consumption, the basic parameters affecting the pollutant concentration were the fuel viscosity, the air-excess ratio, and the sulfur content. The fuel flow pattern occurring at the moment of injection has a strong effect on the unburned particle concentration. Fuel droplets too large and too small fail to burn completely; there is a specific Reynolds number for which the unburned particle concentration has a minimum. The heterogeneity of the fuel jet resolution (disintegration) constitutes a determinant factor for the mechanism of the formation of unburned particles.

26320 **APTIC NO. 48336**

Enik, G. I., T. I. Markina, and I. L. Vangnits

SIFTINGS OF STAVROPOLIC COALS AS RAW MATERIAL USED TO PRODUCE SMOKELESS FUEL. (Otsevy stavropol skikh ugley kak syr ye dlya polucheniya bezdymnogo topliva). Text in Russian. Tr. Inst. Goryuch. Iskop., Moscow, 26(1):68-73, 1971. 9 refs.

A new cokery was designed for the conversion of siftings from Stavropol coals into smokeless coke by applying a continuous coking process with oxidative pyrolysis. The siftings,

with 40-70% below 13 mm, contained 17-32% of ash and 37-43% of volatiles. Siftings from different mines were mixed to secure good agglomeration and sufficient strength of the coke. Coking was done in a temperature range of 600-700 C. The thickness of the plastic layer was 6-13 mm; the swelling numbers ranged from 8 to 40. The coke had a volatile content of about 0.6-11.4% and an ignition temperature of 350-380 C. The coke was in the form of 13-50 mm large particles.

26321 **APTIC NO. 48327**

Martin, G. B., D. W. Pershing, and E. E. Berkau

EFFECTS OF FUEL ADDITIVES ON AIR POLLUTANT EMISSIONS FROM DISTILLATE-OIL-FIRED FURNACES. Environmental Protection Agency, Research Triangle Park, N. C., Office of Air Programs, Pub-AP-87, 86p., June 1971. 15 refs.

NTIS: PB 213630, GPO

The use of fuel additives to control air pollution from distillate- oil-fired systems was examined. The additives tested were commercially available, proprietary formulations; each additive was analyzed for chemical composition and was screened for effect on emission characteristics. Fewer than 10% of the additives affected any pollutant reduction, whereas more than 20% increased emissions of at least one pollutant. In a few cases, metallic additives substantially reduced particulate emissions, but produced a high concentration of metal compounds in the flue gas. Additives did not reduce emissions of carbon monoxide, unburned hydrocarbons, sulfur oxides, or nitrogen oxides. (Author summary modified)

26322 **APTIC NO. 48368**

Smith, James Hart

MOTOR FUEL COMPOSITION AND PHOTOCHEMICAL SMOG. (FINAL REPORT). Stanford Research Inst., Menlo Park, Calif., SRI Proj. SCC-8558, American Petroleum Inst. Pub-4111, 162p., Oct. 1971. 33 refs.

The effect of motor fuel composition on auto exhaust composition and the development of photochemical smog manifestations, with specific applications to the effects on eye irritation, aerosol formation (visibility reduction), and oxidant formation, was investigated. Complete data on automobile operation, cycle checks, chamber loading, smog chamber operation, analytical techniques and instrumentation, fuel characteristics with respect to hydrocarbon contents, exhaust gas characteristics, and relative reactivity of the exhaust are presented. The concentration of total hydrocarbons, nitric oxide, nitrogen dioxide, formaldehyde, oxidant, peroxyacetyl nitrate, peroxybenzoyl nitrate, carbon monoxide, and total aldehydes was measured as a function of time.

CONTROL METHODS

1972

26323 **APTIC NO. 47882**

EXHAUST SYSTEM PASSING TOUGHEST FEDERAL TESTS. Machine Design, 44(26):34-36, 38, Nov. 2, 1972.

The newest emission control system being offered to the automakers is not fouled by leaded fuel, can operate successfully with any known fuel additive, and results in emission levels of carbon monoxide, hydrocarbons, and nitrogen oxides substantially lower than required by the 1976 Federal emission regulations. The Questor Reverter emission control system combines two exhaust thermal reactors and a single catalytic converter. The first stage involves incomplete burning in the first exhaust thermal reactor under conditions of restricted air supply from an engine driven air pump. In the second stage, and in the presence of a catalyst, oxides of nitrogen are chemically reduced. Finally, the exhaust gas is completely oxidized by adding more air from the pump in the second thermal reactor. Performance results from dynamometer runs are indicated, as were the problem areas which still exist. Construction materials are mentioned.

26324 **APTIC NO. 47994**

NINETEEN SEVENTY-THREE PASSENGER CAR ENGINEERING HIGHLIGHTS. Automotive Eng., 80(10):38-47, Oct. 1972.

Safety and emission control equipment is reviewed for American Motors, Chrysler, Ford, and General Motors passenger cars. Bumpers, electronic ignition systems, front-wheel disc brakes, and anti-theft systems have been improved, as well as automotive exhaust control systems. American Motors exhaust gas recirculation system reduces nitrogen oxides by 50%. To help reduce hydrocarbon and carbon monoxide emissions during warmup, all Chrysler-built engines are equipped with an electric assist choke. An air-injection system is used on Chrysler-built cars to be sold in California to reduce HC and CO to required levels. Chrysler has also developed two exhaust recirculation systems. An orifice spark-advance control valve is used on all Chrysler-built cars to control NOx by controlling the rate of vacuum buildup to the vacuum advance chamber of the distributor. Ford and General Motors have also developed exhaust gas recirculation systems. General Motors has developed a new, deeply-chambered piston head for some Chevrolet engines to improve control of HC emissions.

26325 **APTIC NO. 48152**

FLY ASH REMOVAL FROM WASTEWATER. Ind. Wastes, 18(6):38-40, Nov./Dec. 1972.

A chemical processing plant produces activated carbon by burning lignite under heat and pressure in large rotary kilns. The process generates large volumes of fly ash which enters the air and water effluent. The flue gas is sprayed with water and then flows into a venturi scrubber. The wet particles from the saturator and the separator then flow to the fly ash sump. The wastewaters containing particulates are cleaned, neutralized, and clarified.

26326 **APTIC NO. 48161**

RAPID CITY...STEP THREE FOR COAL GAS. Am. Gas Assoc. Monthly, 54(10):8-10, Oct. 1972.

A pilot plant which will test the CO2 Acceptor process of coal gasification is discussed. The plant is designed to try to find a cheaper alternative than using oxygen or electro-thermal heat to produce the temperatures needed to gasify coal. The CO2 Acceptor process, a method of dropping particles of heated crushed dolomite into a gasifier containing heated coal, will be tested. The operating procedure of the gasification section is described. Technical problems encountered and the costs of construction and operation are reviewed.

26327 **APTIC NO. 48198**

U. S. DRIVE FOR SIMON-PURE AUTO ON ROAD TO DISASTER. Oil Gas J., 70(37):47-50, Sept. 11, 1972.

To achieve stringent 1975 and 1976 Federal emission standards, consumers will have to pay at least $500 additional for new cars. Refiners and car manufacturers are unsure of what control methods to take, since the Federal standards have not been finalized. Hydrocarbons and carbon monoxide emissions will probably be controlled by catalytic afterburners, and nitrogen oxides will be controlled by exhaust gas recirculation (EGR). The Inter-Industry Emission Control program has developed a maximum effort control systems using low or no-lead fuel including a system of thermal and catalytic afterburners, EGR, and carburetor enrichment; and a system using a thermal reactor and two catalytic converters, one for NOx and one for HC/CO. A more recent version has a low thermal inertia exhaust manifold replacing the thermal reactor. These arrangements meet 1975 HC and CO standards, but not 1976

NOx standards. Catalysts have not proven very durable, so new catalysts are being studied. The DuPont system does not require the removal of lead from gasoline; it uses thermal reactors, carburetor modifications, EGR, and a lead-trapping device. The trapping system reduces lead particulate emissions by 91%. Air-suspendable lead emissions were reduced by 65% in laboratory tests and 77% in road tests. Another system scrubs lead particles from exhausts with 93-96% efficiency and removes other particles with cyclone separators and glass fiber filters. The composition of gasoline used with these control devices and the use of low octane gasolines cause additional problems. Some work is progressing on alternate engines such as the Wankel, Stirling and turbine engines. There is speculation that there may be more delay before the Environmental Protection Agency issues its final regulations.

26328 **APTIC NO. 48201**

FABRIC FILTERS. Ind. Process Heat., 12(9):36-38, Sept. 1972.

The trend toward the use of fabric filters and the development of the unit concept for dust control is discussed. The fabric filter is the only collector capable of achieving collection efficiencies approaching absolute. This permits the recirculation of the cleaned air within the factory, thus reducing the amount of ducting required and saving on heating costs. The filtering process and different types of fabric filters are described. Air flow characteristics, filtration velocity, and temperature determine the type of filter and its method of application. Limiting factors on the extensive application of fabric filters are noted. Unit dust collectors are almost invariably fabric filters. The unit dust collection system is described and its utility in such operations as mechanical conveying, weighint, sack tipping, filling points, and pneumatic conveying systems, as well as in the conventional processes of drilling, polishing, sawing, and grinding is reviewed. Fabric filtration is a dust collection process which promises to achieve economically ultimate standards in terms of efficiency and practicality.

26329 **APTIC NO. 48206**

VARO MILL MAKES SSSF SECOND BIGGEST MARKET PULP PRODUCER. Paper Trade J., 156(50):39-41, Dec. 4, 1972.

The South Swedish Forest Owners Association (SSSF) has started the construction of a 300,000 metric t/yr bleached kraft mill. Prior to construction, a pollution control program was developed which included water and air pollution control and noise abatement projects. In the new plant all evil smelling gases are collected and blown into a special furnace. The stack gases from this furnace plus gases with less odor contamination are blown to the bark furnace. The stack gases from the recovery boiler pass through three electric precipitators in parallel giving dust collection efficiency of 99.4%. With only two precipitators in operation the efficiency will still be 98.5%. Wood supply, operator training, wood handling, pulping and screening processes, bleaching, pulp drying, and the design philosophy are also reviewed.

26330 **APTIC NO. 48209**

RAND GOLD REFINERY -- BIGGEST LITTLE PLANT IN THE WORLD. Eng. Mining J., 173(11):172-174, Nov. 1972.

Gold refining at a processing plant is discussed. The refinery consists of a chlorination refining section, an electrolytic gold refining section, a silver refining department, and a smelter section. The silver and gold refining processes are described. All gases from furnace operations and air drawn from ventilation hoods in the gold refining,de-golding, and silver melting sections of the refinery are passed through a wet scrubber for fume recovery. The scrubber exhaust is passed through a tube and wire electrostatic precipitator. Fumes from all other refinery sections pass directly to separate electrostatic precipitators of the same design. All borax slags, floor sweepings, crushed furnace linings, discarded crucibles, electrostatic precipitator dusts, and rubbish are processed through the smelter section.

26331 **APTIC NO. 48238**

Transportation Technology Council (Japan) and Council for Countermeasures of Automobile Exhaust Gases (Japan)

COUNTERMEASURES OF EXHAUST GASES FROM AUTOMOBILES IN USE. (Shiyo kateisha ni taisuru jidosha haishutsu gasu taisaku ni tsuite). Text in Japanese. 19p. Oct. 1972.

The best possible methods of abatement of hydrocarbons and nitrogen oxides in automobile exhausts that can be applied to the greatest possible number of automobiles in shortest possible time are discussed. The methods examined included spark timing control, catalytic oxidation, exhaust recirculation, water jet, fuel gas evaporation, blowby gas circulation, and slow speed exhaust control. Spark timing control and catalytic oxidation were recommended as currently available methods. Spark timing control devices should be designed by automobile manufacturers, who in turn must obtain the government s approval with regard to the car types and method of installation, the effectiveness of the device, its effect on the car performances, and the method of inspection and handling. The device has to control more than 7% of hydrocarbons and more than 20% of the nitrogen oxides. Similar recommendations were made for catalytic oxidation methods. In this case, more than 30% of hydrocarbon control has to be effected for 10,000 km of car operation, and the same extent of carbon monoxide control must be achieved. Such catalysts as vanadium, chromium, manganese, cobalt, nickel, and copper must not be left in the open air.

26332 **APTIC NO. 48299**

AIR POLLUTION EQUIPMENT STOPS FURNACE EMISSIONS. Ind. Wastes, 18(5):537, Sept./Oct. 1972.

A new 30,000, 12-story iron-melting complex is equipped with more than $1 million worth of air pollution control equipment. A high-energy venturi scrubber removes almost all the particulates (dust and soot) in furnace effluents and cools the cupola gases to 125 F. Large particulates are mixed with slag granulation water and pumped to a dewatering tank, while smaller effluent particles are piped to settling ponds. The scrubber uses 3000-5000 gal/min of water; most of this comes from water in ponds, and the water is cleaned and recirculated.

26333 **APTIC NO. 48344**

(Inventor not given.)

PROCESS FOR THE EXTRACTION OF SULFUR OXIDES FROM GASES. (Procede pour extraire d une gaz les oxydes du soufre qu il contient). Text in French. (Magnesium Elektron Ltd., Manchester (England)) French Pat. 2,100,222. 7p., Feb. 21, 1972. (Appl. July 5, 1971, 10 claims).

A process for the extraction of sulfur oxides from gases by means of zirconium oxide as the absorbent, and a process for the preparation of this absorbent are described. Zirconium oxide granules are obtained by heating zirconium in the presence of caustic soda, after which the mixture is cooled and washed with water for the removal of excess soda and sodium silicate. The zirconium oxide thus obtained is then heated at about 850 C. The gas passing through the granular absorbent has a temperature of 130-150 C or 300-350 C. Spent absorbent is regenerated at 550 C while contacting nitrogen, air, or hydrogen for reduction.

26334 **APTIC NO. 48346**

(Inventor not given.)

PROCESS AND DEVICE FOR THE SEPARATION OF PARTICULATE POLLUTANTS FROM GASES. (Procede et dispositif de separation de particules etrangeres contenues dans un gaz). Text in French. (Assignee

not given.) French Pat. 2,094,304. 10p., Jan. 10, 1972. (Appl. June 15, 1970, 11 claims).

A fluidized bed particle separator for waste gases is described. The fluidized bed, consisting of granules of sand, expanded fire-clay, slag, or light-weight expanded spheres of polystyrene or other plastic material for adhesive particles, and of fatty or other adhesive material for non-adhesive particles, is located inside a diffusor with gas streaming from the bottom. The diameters of the fluidized-bed granules vary from below 1 mm to a few cm. Adequate devices for feeding and removing granules from the fluidized bed are provided.

26335 **APTIC NO. 48347**

(Inventor not given.)

ANNULAR VENTURI SCRUBBING TOWER. (Tour de lavage a venturi annulaire). Text in French. (Chemical Construction Corporation, New York) French Pat. 2,095,041. 14p., Jan. 10, 1972. (Appl. May 26, 1971, 8 claims).

An annular venturi scrubbing tower for the treatment of industrial or power plant-generated waste gases is described. The scrubber is composed of a deflector in the shape of a truncated cone followed by a cylindrical zone and by a gas-liquid separator, a conic deflector with its bottom lying in the same vertical plane as that of the truncated cone deflector, of the horizontal deflectors forming radial extensions of the above deflectors, and of the wash liquid inlets placed above the deflectors. The radial and horizontal deflectors are in the form of spaced segments, and the conic and horizontal deflectors rotate around a vertical axis. The wash liquid inlet for the conic deflector comprises a cylindrical vertical deflector, and is placed coaxially above the conic deflector to produce turbulent liquid flow.

26336 **APTIC NO. 48348**

(Inventor not given.)

DEVICE FOR REDUCING THE POLLUTANT CONTENT IN INTERNAL COMBUSTION ENGINE EXHAUST GASES. (Dispositif pour reduire la teneur en polluants des gaz d echappement des moteurs a combustion interne). Text in French. Regie Nationale des Usines Renault (France)) French Pat. 2,094,727. 6p., Jan. 10, 1972. (Appl. July 8, 1970, 2 claims).

A gas turbine for the catalytic oxidation of carbon monoxide and unburned residues in internal combustion engines exhaust gases is described. The gas turbine through which the exhaust gas is passed contains fixed and mobile plates which are held by a shaft connected to a power generating unit such as alternator for the utilization of the waste heat formed during the catalytic afterburning. Both the mobile and the fixed plates are coated with a catalyst such as platinum, palladium, osmium, nickel, thorium oxide, cerium oxide, iron cobaltite, or copper chromite.

26337 **APTIC NO. 48381**

Applied Technology Corp., Pittsburgh, Pa.

SO2 FREE TWO-STAGE COAL COMBUSTION PROCESS. Environmental Protection Agency Contract CPA 70-146, EPA-R2-72-035, 60p., Aug. 1972. 3 refs.

NTIS: PB 211888

A new sulfur dioxide-free two-stage coal combustion process is examined. In the process, coal is dissolved by injection into molten iron and simultaneously the dissolved coal carbon is oxidized with injected air to carbon monoxide. Under the reducing conditions existing during combustion, coal sulfur is not oxidized but transferred from the iron to a slag consisting of coal ash and added limestone. A sulfur-free offgas of CO, hydrogen, and nitrogen is produced for use in power plant boilers. In experimental studies, a boiler stack gas with less than 50 ppm SO2 was produced. Combustor design parameters and optimum operating conditions were established. The slags can be successfully desulfurized with steam to produce elemental sulfur and a hydrogen sulfide/SO2 gas stream suitable for additional elemental sulfur recovery in a Claus plant. Process economics are reviewed. (Author abstract modified)

26338 **APTIC NO. 48271**

Atack, Jack

HOW CANADIAN INDUSTRY AND UTILITIES ARE WAGING WAR AGAINST AIR POLLUTION. Elec. News Eng., 81(9):16-21, Sept. 1972.

Control devices suitable for removing particulates include inertial separators, cyclones, wet collectors, baghouses, and electrostatic precipitators; control methods suitable for gases and vapors include afterburners or fume incinerators, adsorption equipment, vapor condensers, and gas absorbers. The most serious pollution problem is the discharge of sulfur oxides (trioxide and dioxide) Limestone scrubbing, magnesium oxide and sodium compound scrubbing, tall stacks, sulfuric acid recovery and catalytic oxidation are possible SOx control methods. By mid-1975, rigid SO2 standards will become prevalent throughout the U. S. Daily SO2 concentrations should be below 0.14 ppm and the yearly average should be below 0.03 ppm. Nitrogen oxide standards have been set at 0.05 ppm for 1975. Two-stage combustion, scrubbing, and process modifications can be used to reduce NOx emissions. Power plants, the cement industry, steel production, and nickel production all face many problems in controlling pollution. The control programs of several Canadian companies from these industries are discussed.

26339 **APTIC NO. 47956**

Atsukawa, Masumi, Kazumi Kamei, Toshihiko Furuki, and Kikushi Tsuneyoshi

METHOD TO SCRUB FLUE GAS CONTAINING SULFUR OXIDE WITH LIME SLURRY. (Sankaiwo o fukumu haigasu no sekkai surari ni yoru senjohoho). Text in Japanese. (Mitsubishi Heavy Industries, Tokyo (Japan)) Japan. Pat. Sho 47-46263. 4p., Nov. 21, 1972. (Appl. Dec. 29, 1970, 1 claim).

In the desulfurization process in which a lime or calcium carbonate suspension is used as an absorbent to remove sulfur oxides from flue gases, scales form on the internal wall surface of the absorption tower or pipelines in a comparatively short time due to the extremely low solubility of the calcium sulfite produced in the absorbent and of lime or calcium carbonate itself. This results in an increase of pressure loss or clogging up of the pipelines. Therefore, the operation of the process has to be suspended occasionally in order to remove the scales chemically or mechanically. The solubility of calcium sulfite in [illegible] 3.9-4.0 solution is 130-140 times greater than in a pH 6.5 solution. In the new system, flue gas is first fed into the first absorption tower. Then it goes into the second absorption tower while the absorbent solution is fed in the opposite direction, from the second to the first. In the first tower, the flue gas contacts with the absorbent fed in from the second, thereby maintaining the pH level of the absorbent below four. This completely eliminates the scale trouble in the first tower. In the second tower, the absorbent solution of a high pH level is fed in from the absorbent adjuster tank and absorbs sulfur oxides. The pH value of the absorbent is kept above seven due to the presence of lime or calcium carbonate that has not reacted yet; scales form on the wall of the tower and other parts due to the extremely low solubility of calcium sulfite and calcium carbonate at this pH level. At an appropriate time interval, say, once a month, the flow channels of the flue gas and absorbent are switched to make the second tower serve as the first, and vice versa, thereby removing the deposited scales.

26340 **APTIC NO. 48350**

Baudry, Jean

DEVICE FOR THE REDUCTION OF UNBURNED HYDROCARBON EMISSIONS FROM EXTERNAL CARBURETION ENGINES DURING DECELERATION. (Dispositif reduisant d hydrocarbures imbrules par les moteurs a carburation externe pendant les periodes de deceleration). Text in French. (Inst. Francais du Petrole, des Carburants et Lubrifiants, Paris (France)) French Pat. 2,097,240. 6p., Feb. 2, 1972. 1 ref. (Appl. June 10, 1970, 2 claims).

A device for reducing the unburned hydrocarbon content in external carburetion engine exhaust gas during deceleration is described. The device contains an air feed pipe through which fresh air is admitted into the cylinder during deceleration. The point at which the air supply line is connected to the cylinder feed pipe is selected in such a manner that the volume of the feed pipe section between this connection point and an intermittent obturator located at the cylinder is not larger than 1/3 or 1/2 the volume of the feed pipe section between the carburetor and the intermittant obturator.

26341 **APTIC NO. 48288**

Bettelheim, J., B. H. M. Billingee, and A. C. Collins

SOME PROBLEMS OF DRY PROCESSES FOR REMOVING SO2 FROM FLUE GASES. Energy Dig., 1(1):29-35, Aug./Sept. 1972. 21 refs. (Presented at the National Society for Clean Air, Spring Seminar, 1972.)

Engineering evaluations were made of the alkalized alumina, active carbon, and modified Claus processes for removal of sulfur dioxide from flue gas. In the alkalized alumina process, sodium aluminate is reacted with flue gas at 100-350 C and regenerated at 650-750 C in a reducing gas. The ideal solid properties of high reactivity and good attrition resistance are generally counter operative. Rapid SO2 uptake by the solid is usually achieved by having an easily accessible internal surface area. This requires a pore structure large enough to permit rapid diffusion but which also tends to make the material friable and easily attrited. Fixed and fluidized bed experiments indicated that these dense phase solids handling systems have appreciable capital cost benefits compared with a dilute phase system. The active carbon process requires retention of SO2 on carbon at 100 C; recovery of the retained sulfur species is achieved by washing the carbon with water or heating the carbon to 400 C. Washing does not seriously affect the carbon but produces unmarketable weak sulfuric acid. Thermal treatment yields concentrated SO2 suitable for further processing to sulfur but also leads to substantial loss of carbon. At a 2000 mw power station, the loss could amount to 6000 kg/hr. The modified Claus process involves the addition of hydrogen sulfide to flue gas in the presence of an alumina catalyst at 100 C. The sulfur deposited on the catalyst is removed for regeneration. The principle problem in implementing the process is ensuring that the injected H2S is totally removed from the tail gases. The chemical reactions of these processes are discussed.

26342 **APTIC NO. 47980**

Campau, R. M., A. Stefan, and E. F. Hancock

FORD DURABILITY EXPERIENCE ON LOW EMISSION CONCEPT VEHICLES. SAE (Soc. Automot. Engrs.) Spec. Pub., no. 370:1-30, May 1972. 23 refs. (Presented at the National Automobile Engineering Meeting, Detroit, Mich., May 22-26, 1972, Paper 720488; also presented at the American Petroleum Institute, Refining Division Meeting, New York, N. Y., May 8-11, 1972.)

Low emission concept systems are discussed including: thermal reactor only; pelleted HC/CO catalysts mounted in the rear of the vehicle plus revised fuel volatility; a combined thermal reactor and hydrocarbon/carbon monoxide monolithic catalyst system; a dual bed pelleted (nitrogen oxides HC/CO) catalyst system; dual monolithic catalyst (NOx-HC/CO) system; and a system combining low thermal inertia exhaust manifolds with dual bed (oxides of nitrogen and HC/CO) catalytic converters. Problems shown to influence either emission performance or vehicle function during both atypical and normal vehicle operation include the melting of monolithic catalyst support structures, the deleterious effect of the sulfur content of gasoline on the performance of pelleted NOx catalysts, and the loss of emission control with malfunctioning engine components. Vehicle fuel economy and performance losses with these types of systems is documented. None of these systems met the Inter-Industry Emission Control Program low mileage research emission targets established from the 1970 Clean Air Amendment. At low mileage, some of the systems approached the IIEC interim durability targets which were established at a higher level. Current redesign efforts on these low emission concept vehicle systems in an attempt to overcome the durability problem are described. Such redesign efforts include possible alterations in fuel volatility characteristics of the gasoline. (Author abstract modified)

26343 **APTIC NO. 47865**

Chander, Yu. I., S. Z. Belinskiy, and L. G. Borisovskiy

CLEANING OF GASES EMITTED BY ROTARY CLAY BAKING KILNS. (Ochistka otkhodyashchikh gazov vrashchayushchikhsya pechey dlya obzhiga gliny na shamot). Text in Russian. Ogneupory (USSR), no. 9:38-41, Sept. 1972. 4 refs.

Three different waste gas cleaning systems for rotary clay baking kilns are described. A settling chamber-heat exchanger-electrostatic dust precipitator system with a capacity of 12,000-17,000 N cu m/hr had an efficiency of 62-65% at a flow rate of 1.88 m/sec. Another system composed of settling chamber, waste heat boiler and electrostatic dust precipitator has an efficiency of 96% during normal operation, and 85% during knocking. A waste-heat boiler-electrostatic dust precipitator arrangement operates at an efficiency of 92.6% at a gas flow rate of 1 m/sec, maximum. Preliminary dust separation by mechanical devices, and gas flow rates reduced to or below 1 m/sec in the active zone of the electrostatic dust precipitator are necessary for the treatment of waste gases with dust contents higher than 15 g/N cu m.

26344 **APTIC NO. 48268**

Collett, D.

PROBLEMS OF ODOUR. Process Biochem., 7(11):17-18, Nov. 1972.

Release of an odor can be restricted, but not totally eliminated, and then a masking agent can be used to minimize odor nuisance. Sensitivity to smell varies individually, thus making measurement by perception non-exact. Several British laws have been passed which restrict odors. Control methods include wet scrubbing, dry filters, ultraviolet irradiation, and masking. Direct addition, spraying, metered feeding, and dispensers are used to deliver masking chemicals. In food processing, masking compounds are never added before the effluent stages. When treating waste gases, a compound can be added to the scrubbing water or gases may be treated directly with an atomizing spray at the base of the exhaust stack. Aerial spraying can be used for large open areas. Compounds can also be added directly to liquid effluents giving off odors. A combined deodorant, disinfectant, and detergent has been developed.

26345 **APTIC NO. 48149**

Darby, K. and C. Whitehead

CLEANING GASES FROM MUNICIPAL INCINERATORS. Filtration Separation (Purley), 9(6):697, 699-702, 704-706, 709, Dec. 1972. (Presented at the Filtration Society Symposium on the Prevention of Air Pollution from Incineration, Manchester, England, Jan. 18, 1972.)

The problems of cleaning waste gases from municipal waste incinerators are reviewed. Methods of cooling the gas from 1000 200 C and the design, operation, advantages, and disadvantages of gas cleaning devices are examined. The four principal methods for emission control include the cyclone, bag filters, high energy scrubbers, and electrostatic precipitators. The implementation of a spray cooling tower followed by an electrostatic precipitator is described.

26346 **APTIC NO. 48160**

Dillon, John A.

GASOLINE INTERNAL COMBUSTION: THE ALTERNATIVES. Instr. Control Systems, 45(10):19-20, 22, Oct. 1972.

Emissions of unburned hydrocarbons, carbon monoxide, and nitrogen oxides in automobile exhaust were limited by the 1970 Clean Air Act Amendments. To comply with the new emission standards research has been concentrated on devices such as catalytic mufflers and thermal reactors for use with conventional gasoline thermal combustion engines. Techniques such as exhaust gas reciruclation to reduce operating temperatures, and the use of lower compression ratios were also considered. The alternatives to a gasoline internal combustion engine include the use of diesel engines, Stirling engines, steam propulsion, turbines, and electric-powered cars. Problems in development and the advantages of each of these alternatives are discussed. The costs of producing conventional internal combustion engines and the alternative systems are compared.

26347 **APTIC NO. 48215**

Dobrinescu, D.

IMPROVING THE HEAT RECOVERY FROM GASES UTILIZED IN THE REGENERATION OF CRACKING CATALYSTS. (Majorarea recuperarii caldurii din gazele de regenerare a catalizatorilor de cracare). Text in Rumanian. Energetica (Bucharest), 20(6):255-262, June 1972. 21 refs.

A draft for heat recovery and carbon monoxide (CO) conversion from regenerator gases emitted in the process of catalyst recovery in a fluidized bed catalytic cracking facility is presented. One million tons of raw material used per year consume 111,700 kg air/hr and generate 121,150 kg combustion gases per hr containing CO, water vapor, nitrogen, carbon dioxide, and oxygen in 6.93, 7.21, 70.72, 14.95, and 0.19 weight percentages, respectively. These gases enter the turbine at a 2.9 bar pressure and 680 C temperature, and leave the turbine at 1.2 bar and 510 C, respectively. The burner of the recovery boiler is then supplied with the combustion gases leaving the turbine, with 1300 kg/hr of additional fuel and with 69,860 kg of excess air/hr. Burning results in 192,310 kg/hr of combustion gases with a 968 C temperature and a total excess air coefficient of 1.2. These conditions provide for the complete burning of the 8400 kg/hr of CO emitted by the catalyst regenerator facility. The vapor generated by the recovering boiler can be utilized either for conversion into electric energy alone or for both electric energy and technological vapor needs. The system provides CO pollution control and high economic value heat recovery.

26348 **APTIC NO. 47863**

Dumon, R

THE FIGHT AGAINST SMELLS, A HARMFUL EFFECT OF A SOPHISTICATED WORLD. (La lutte contre les odeurs, nuisances d un monde raffine). Text in French. Chim. Ind., Genie Chim., 105(18): 1255-1260, Aug.-Sept. 1972.

General problems and possibilities of odorous emission control are reviewed. Incineration of odorous gases to water and carbon dioxide, possibly using additional fuel, should be done at a minimum temperature of 900 C. Catalytic odor destruction is used in petroleum refineries, in surface-coating shops, and in formaldehyde, plastic, and printing ink manufacturing plants. Scrubbers using water with added oxidizing or neutralizing agent are suitable for combined deodorization and dust removal. Adsorption on activated carbon, alumina, or silicagel is applied to waste gases with low concentrations (1-5 ppm) of odorous substances. Masking can be applied under certain conditions for nontoxic odorous substances. Ozonization is highly effective for odorous emissions from e.g., phenol and synthetic rubber manufacturing plants and from fermentation processes.

26349 **APTIC NO. 48438**

Dumon, R.

CHEMICAL ENGINEERING AND THE ENVIRONMENT. (Genie chimique et environnement). Text in French Tech. Moderne, 64(11):35-39, Nov. 1972.

Contributions by chemical engineering to pollution control are reviewed with special regard to related developments by the S. A. Heurty Company. Unlike other processes where sulfur dioxide, sulfuric acid, or sulfates and sulfites are obtained as a final product from flue gas desulfurization, the Heurty fluidized bed desulfurization process using calcium oxide or calcium carbonate as an additive yields elementary sulfur. Two different processes for the abatement of nitrogen oxides in combustion gases (catalytic reduction following dust separation and scrubbing with alkaline water or magnesia solution) are being studied. Mechanical dust separators, electrostatic precipitators, filters, and scrubbers can be used for controlling particulate emissions. Odor control is possible by scrubbing with sodium carbonate, water, permanganate, or chlorine as additives, by thermal incineration, and by absorption by means of activated carbon. Gasification is a method for removing sulfur from fuels.

26350 **APTIC NO. 48275**

Eckert, John S.

WET PACKED GAS SCRUBBERS. Australian Chem. Process. Eng. (Sydney), 25(9):13-18, Sept. 1972. 8 refs.

Wet packed scrubbers operate on the principle of presenting a large wetted area over which a gas such as air flows. Scrubbing is accomplished by impingement of particulates on the wetted packing or by contact of gas molecules mixed with the gas to be scrubbed with the wetted surface. Scrubber capacity is calculated, and packing factors (wet and dump packed) are listed. The pressure-drop correlation which may be used to arrive at the pressure-drop for any loading condition of the packed bed, and the mass transfer coefficient are calculated. The technique for sizing packed beds is reviewed, and the efficiency of packed scrubbers is considered. Odor thresholds are listed for a variety of compounds. The packed bed is very effective for removing noxious gases from air, and is also effective for removing suspended solids and liquids if their particle size is not too small

26351 **APTIC NO. 48224**

Egger, A. M. and R. Braendli

THE GASOLINE CRACKING PLANT OF THE LONZA COMPANY. (Die Benzinspaltanlage der Lonza AG). Text in German. Chimia, 26(11):586-589, Nov. 1972.

The Montecatini gasoline cracking process adopted at the gasoline cracking plant of the Lonza Company is described. The raw gas obtained by high-temperature pyrolysis of the light gasoline fraction contains ethylene, acetylene, methane, carbon monoxide, carbon dioxide, and hydrogen as principal components. Tarry residues are removed from the raw gas by scrubbing with hot gas oil in a venturi scrubber. The CO2 is separated from the raw gas by means of ammonia at 20 C. Higher acetylenes and benzene are separated by means of methanol at -40 C, and C3-C4 olefins are removed by means of octane. The gas containing ethylene, methane, and CO is cooled by liquefied nitrogen to -104 to -210 C for separation of the individual components. The CO is converted into CO2 and water by means of water vapor on an iron-chromium catalyst.

26352 **APTIC NO. 48102**

Emerson, Charles

EDM FOR HIGH OUTPUT: Am. Machinist, 116(24):62-64, Nov. 27, 1972.

Auto plant production rates are being equaled in three electrical-discharge machine (EDM) operations that help carburetors meet tighter emission standards. One operation produces a butterfly bypass slot in the carburetor throat; this slot smooths out the transition from ideal to go by passing air-fuel mixture when the driver starts to move his car. Another operation cuts two bleed holes in the support-carburetor booster venturi, while the third operation drills side bleed holes in brass idle tubes for the same carburetors. Two factors are responsible for the high production rates of the magazine-fed multiple-electrode machines used in these operations: the cycle rate is fast because of the small amount of metal removed; and the machines produce holes without burrs, thus eliminating hand-deburring.

26353 **APTIC NO. 47876**

Feygin, S. A. and S. B. Kostyukovskaya

MANUFACTURING OF LOW SULFUR FUEL FOR THE SUPPLY OF CITY THERMOELECTRIC POWER PLANTS WITH LOW SULFUR CONTENT MAZUT. (Proizvodstvo kotel nogo topliva s ponizhennym soderzhaniyem sery i puti obespecheniya gorodskikh TETs malosernistym mazutom). Text in Russian. Teploenergetika, no. 10:9-11, Oct. 1972.

Possibilities of the manufacture of low-sulfur fuel, especially mazut, (black oil), to supply city thermoelectric power plants are described. Both the preliminary gasification of high-sulfur mazut at thermal power plants, and the application of flue gas cleaning, which later would increase the energy costs by 23%, would require adequate facilities for the conversion of the sulfur retained into chemical products. Technical and economic analyses revealed the advantage of the desulfurization at petroleum refineries through combining hydrogenation with thermal contact cracking of the distillates. It will be possible to reduce the mazut sulfur content to 0.5-1% by the above techniques. The increase in the cost of the low-sulfur mazut expected from the desulfurization will require price adjustments.

26354 **APTIC NO. 48197**

Fujinami, K., T. Nobusawa, S. Takasaki, D. Konno, M. Yokomine, H. Kitamura, H. Terada, T. Ogura, Y. Munakata, T. Kodera, D. Saeki, S. Kimura, Z. Sakai, H. Miyazaki, S. Taguchi, T. Ogushi, and S. Sekida

RECORDS OF A PANEL DISCUSSION ON NOISE AND ODOR PREVENTION. (Boon to boshu ni kansuru zadankai kiroku). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 39(10):33-66, Oct. 1972. 48095 Gallois, Jacques DEVELOPMENT OF A NEW COMBUSTION CHAMBER FOR LOW EXHAUST EMISSIONS. Diesel Gas Turbine Progr., 38(12):30-31, Dec. 1972.

A four-strike diesel engine with a precombustion chamber was compared with a direct injection diesel engine. Specific fuel consumption was lower in the direct injection engine, but the precombustion chamber was lower in the direct injection engine, but the precombustion chamber engine had reduced nitrogen oxides in exhaust gases and excellent control of injection time, facilitating the combustion of heaby fuels. A new precombustion chamber was designed to reduce load losses caused by passage of air and gas through orifices in the combustion chamber and to end losses due to turbulence. In this chamber, the speed of mixing of air and gases is varied according to degree of crankshaft rotation. Fuel consumption is the same as for direct injection engines. Nitrogen oxide and hydrocarbon emissions are 5 h/hp/hr and 0.15 g/hp/hr, respectively.

26355 **APTIC NO. 48005**

Gerlach, Werner

NEW GENERATION INKS. HARDWARE. Am. Ink Maker, 9(50):26, 28, 65-66, Sept. 1972. (Presented at the National Association of Printing Ink Manufacturers, Annual Convention, 58th, Colorado Springs, Colo., June 1972.)

Radiant, steam drum, line burner, medium velocity, and high velocity dryers are used to dry heat-set inks during printing. Several types of equipment are used to maintain a low percentage of the low explosive limit and to remove pollutants. Afterburners heat exhaust gases to 1200-2000 F in order to remove hydrocarbons. Catalytic oxidizers are used both in printing and in automotive exhaust control. Scrubbers, electrostatic precipitators, and activated charcoal absorbers are often used to control printing pollution. Another control method is the use of oxidative inks with a quick setting top coat without drying. Ultraviolet drying inks and dryers are also discussed.

26356 **APTIC NO. 48097**

Gibbs, E. R.

THEORY AND APPLICATION OF ELECTROSTATIC PRECIPITATORS. Pit Quarry, 65(3):118-119, 123, Sept. 1972.

Electrostatic precipitator design is predicated on three basic parameters: resistivity of the particulate matter to be collected; total gas flow to be treated; and required collection efficiency. These three factors must be specified as accurately as possible. In nonmetallic industries, electrostatic precipitators are used successfully on wet process cement kilns, clinker coolers, and lime kilns. They can also be applied to dry process cement kilns, grinder mills, and roller mills. New precipitator developments include improved discharge elctrode and companion support systems, solid state microcircuit rapper timers, factory sealed-zero maintenance rappers, and solid state automatic power control equipment. Ten possibilities for upgrading the performance of existing precipitators are outlined. One involves the use of additive treatment systems to improve the resistivity of dust. Residual reductions of 50% or more can be achieved with these systems.

26357 **APTIC NO. 48244**

Gilde, Ye. E., N. V. Golovanov, Z. V. Lesnikovskaya, I. Ya. Marone, and B. D. Kantselson

A STUDY OF THE FIRST IN THE USSR SMALL SIZE E-40 VN VORTICAL STEAM GENERATOR WITH GAS DISPOSAL. (Issledovaniye malogabaritnogo vikhrevogo parogeneratora E-40 VN pervoy v SSSR PGU so sbrosom gazov). Text in Russian. Teploenergetika, no. 10:31-34, Oc . 1972. 4 refs.

Studies of a small-size vertical steam generator of a pilot plant steam and gas generator assembly are described. The steam generator, with a steam output of 40 t/hr at a temperature of 440 C and at a pressure of 40 kg/sq cm, can operate in a steam and power cycle with flue gas recirculation, in a steam and gas cycle with a regenerator receiving the gas turbine exhaust, and in a steam and gas cycle without a regenerator. The combustion of mazout and natural gas in the steam generator with a vortical furnace is possible with a small excess air coefficient of 1.03 at a maximum oxygen concentration of 15% in the fuel and a thermal load of up to 500,000 kcal/cu m h. To ensure separate operation of the steam power unit of the steam and gas generator plant, the burners of the steam generator should have adjustable outlet cross sections, and the auxiliary air temperature and the rate of gas recirculation should be adjusted with respect to the adiabatic temperature conditions in the steam generator furnace for steam-gas and steam-power cycles.

26358 **APTIC NO. 48305**

Goto, Hideo

SCRUBBER. (Sukuraba). Text in Japanese. (Seo Nozzle Sales Co., Ltd., Osaka (Japan)) Japan. Pat. Sho 47-48989. 3p., Dec. 9, 1972. (Appl. Aug. 14, 1970, 1 claim).

A scrubber which comes in an upright, cylindrical casing, is described. The water storage tank is provided on the bottom. In the intake port is a spray nozzle for the first-stage scrubbing. Three groups of spray nozzles are fitted on the internal wall of the casing, one group immediately below the intake port and other two 120 deg apart from each other; the second group located lower than the first and the third lower than the second. Between these nozzle groups are three sets of the flow-adjuster boards installed on the internal wall in the similar arrangement, each set consisting of two concentric arc boards properly spaced from each other. Another spray nozzle is suspended from above in the inner tube. The gas is sucked into the scrubber by means of a blower to which the exhaust hood is connected. As the gas is taken in through the intake port, it is scrubbed with the first-stage spray nozzle and then flows downward between the inner tube and the outer casing, during which it is scrubbed with the three groups of spray nozzles while its flow is rectified by the flow-adjuster boards. The gas then hits the surface of the water in the storage tank, after which it turns upward into the inner tube, thus contacting the conical structure and the netting on the lower part of the inner tube becomes wetter. The gas is once again scrubbed with the spray nozzle suspended from above in the inner tube before it is sucked into the exhaust hood for discharge.

26359 **APTIC NO. 48259**

Gruemm, H.

ELECTRIC POWER GENERATION FROM NUCLEAR ENERGY, FISSION FUEL RESERVES, AND EFFECTS ON THE ENVIRONMENT. (Elektrizitaetserzeugung aus Kernenergie - Spaltstoffvorraete und Umwelteffekte). Text in German. O.Z.E. (Oesterr. Z. Elektr.), 25(9):355-361, Sept. 1972. 8 refs. (Presented at the Verband der Elektrizitaetswerke Oesterreichs Meeting, Salzburg, Austria, June 13-16, 1972.)

Prospects of fossil fuel reserves and of the use of fission fuel for power production, and its environmental effects are outlined. The success and prospects of electric energy generation from fission fuels, available in practically unlimited supply, is largely dependent on the development of breeder reactors. Controlled fusion in nuclear power plants, a possibility belonging to the distant future after 2000, constitutes an inexhaustible source of energy, provided deuterium-deuterium fusion without the need for lithium is possible. Nuclear power plants, while representing catastrophic potential hazards, emit no conventional pollutants as thermal power plants do, and the radioactivity around nuclear power plants is negligible, and often even smaller than around thermal power plants, since the coal the latter use is radioactive by nature. The operation-related mortality among nuclear facility employees is extremely low (0.1 per one million).

26360 **APTIC NO. 48394**

Hagerup-Jenssen, J. H.

FURNACE 11. GAS PURIFICATION -- RECOVERY. (Ovn 11. Gassrensig -- Gjenvinning). 1972. Translated from Norwegian by Scientific Translation Service, Inc., Santa Barbara, Calif., 13p., 1972.

The design and operation of the gas purification, recovery, and cooling water plant for furnace 11 are defined. The furnace is equipped with two gas purification plants; the gas is purified in three stages. Each stage is equipped with an ejector (water jet) that washes the gas and simultaneously serves the purpose of a fan. Each plant has a capacity of 10,000 cu N m/hr which is sufficient for the removal of all the furnace gas from a furnace operating at maximum load.

26361 **APTIC NO. 48272**

Hall, H. T.

IMPROVEMENTS IN STEEL FOUNDRY EQUIPMENT, MATERIALS AND TECHNIQUES OVER THE LAST DECADE. Brit. Foundryman, 65(10):378-381, Oct. 1972. (Presented at the Institute of British Foundrymen, Annual Conference, Session D, Eastbourne, England, June 1972.)

During the last decade the number of steel foundries has decreased by 20%. Modern industrial conditions and the cost of re-equipping favor large firms. Scrap is often used in steelmaking now. During the last decade, pollution control equipment has been added to many of the steel foundry processes. For example, cupolas must be wet scrubber systems to eliminate the fume. The electric arc steel-making S.C.R.A.T.A. process is being used increasingly for fumeless refining; in it, iron oxides are injected which cause a reducing atmosphere above the liquid steel bath, thus eliminating fume formation. New analytical systems have helped improve monitoring and control of steel processes. Several deoxidizers have been developed which improve cleanliness of the steel. New equipment and processes are also being used in mold-making and fettling. In the past decade, the traditional lung diseases of foundrymen have disappeared because of improved air quality. Future problems in steel foundries are mentioned.

26362 **APTIC NO. 47957**

Harada, Masanori

CONTROL MEASURES FOR EXHAUST EMISSION OF SPARK IGNITION ENGINE. (Hibana tenka kikan no haiki taisaku). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 11(131):88-100, Nov., 1972. 15 refs.

With an air/fuel ratio of 16:1, the carbon monoxide emission concentration stays constant in automobile exhausts, while it drastically increases with a ratio higher than 15:1. The hydrocarbons decrease with the lower ratio but rise with an air/fuel ratio lower than a certain point. The nitrogen oxides emission is highest at the ratio of 15:1, but decreases at greater or lesser ratios. When the higher ratio is selected in favor of NOx reduction, the problem of increased CO emission arises. If the lower ratio is selected, there will be no problem of increased CO emission but engine performance and fuel economy deteriorates. Both HC and NOx can be reduced by delaying the ignition timing. But this adversely affects the fuel economy and stable performance of the engine. The CO emission also increases, however slightly. A further delay in the ignition timing results in increased air intake volume and in all the NOx, HC, and CO emissions. An improved combustion chamber design is a possible solution to the emission problem. Reduction of NOx by exhaust gas recirculation and reduction of NOx and HC by valve timing are discussed at some length. An improved intake system is discussed in which the intake air only or the air/fuel mixture will be quickly heated such as by a proposed quick heat system using the exhaust gas to heat the intake. Afterburners and a catalyst converter system are also discussed.

26363 **APTIC NO. 48253**

Harada, Sadaaki, Torata Murakami, Hirobumi Shibata, and Yoshiaki Harada

REMOVAL METHOD OF HYDROCYANIC ACID GAS IN THE FIRST STAGE OF THE FUEL GAS REFINERY PROCESS. (Nenryo gasu seisei saizendan ni okeru seisangasu no jokyoho). Text in Japanese. (Osaka Gas Co., Ltd. (Japan)) Japan. Pat. Sho 47-47842. 10p., Dec. 2, 1972. (Appl. Nov. 24, 1969, 1 claim).

Hydrocyanic acid gas can be removed from fuel gas also containing hydrogen sulfide and ammonia by scrubbing with the circulating ammonium sulfide water solution that contains granular particulate sulfur, water soluble sulfite, and/or water soluble bicarbonate, and a surface active agent, thereby removing hydrocyanic acid as thiocyanate. It has been theoretically known that the HCN of a fuel gas can be arrested and then fixed as thiocyanate for removal when the fuel gas is scrubbed with an alkaline water solution containing suspended powder sulfur. This conventional method is, however, subject to two practical disadvantages. The first is the problem of equipment corrosion. The second is inactivation of the suspended sulfur since the sulfur becomes covered with oil contained in the fuel gas, thus becoming inactive in arresting the hydrocyanic acid. This is inevitable unless the oil (including benzene, naphthalene, and tar) of the fuel gas are removed to about 0.2 g/cu m or less. Under the new method, the first problem has been solved by having the water soluble sulfite and/or water soluble bicarbonate coexist together with the suspended sulfur in the HCN acid absorbent solution circulating through the HCN removal tower. The surface active agent present in the solution eliminates the second disadvantage. All this makes continuous operation possible for an extended period of time.

26364 **APTIC NO. 48314**

Hattori, Isao

AUTOMATIC RENEWAL SYSTEM FOR A FILTER REMOVING HARMFUL GASES. (Yugaigasu jokyo firuta no jidokoshin hoshiki). Text in Japanese. (Takasago Netsugaku Kogyo Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-50513. 4p., Dec. 19, 1972. (Appl. May 14, 1970, 1 claim).

A fixed length of a roll filter installed in a harmful gas filter device can be automatically wound to renew the portion of the filter exposed to the waste gas. A photoelectric colorimetric method is used to determine when the filter should be wound by measuring the gas in front and behind the filter. When the need for a new filter surace is indicated, an electric signal is transmitted automatically to the filter takeup mechanism, and the filter is wound for a fixed length.

26365 **APTIC NO. 48343**

Hay, Leon

IMPROVED PROCESS FOR THE PURIFICATION OF GASEOUS MIXTURES CONTAINING CARBON MONOXIDE. (Procede ameliore d epuration de melanges de gaz contenant CO a titre d impurete). Text in French. (L Air Liquide, Societe Anonyme pour l Etude et l Exploitation des Procedes Georges Claude (France)) French Pat. 2,094,476. 7p., Jan. 10, 1972. (Appl. June 23, 1970, 8 claims).

A process for the removal of carbon monoxide from gases such as hydrogen, nitrogen, oxygen, and inert gases by means of a molecular sieve is described. The molecular sieve is composed of natural, artificial, or synthetic zeolite in the form of mordenite, which is mixed with metallic copper or with copper ions. The reaction between CO and the molecular sieve takes place at room temperature.

26366 **APTIC NO. 48114**

Hewitt, H. N.

CANADIAN REFINER GOES HYDROCRACKING ROUTE IN EXPANSION. Oil Gas J., (70648):70-72, Nov. 27, 1972. (Presented at the Canadian Chemical Engineering Conference, Toronto, Ontario, Sept. 19, 1972.)

A major addition to a Canadian refinery in the Montreal area is an Isomax hydrocracker unit designed to crack a gas-oil feed into lighter products in the presence of hydrogen at high temperature and pressure. The hydrocracker and the hydrogen plant account for 35% and 15%, respectively, of a $50 million expenditure for a three-year expansion program. The feed for the hydrocracker is a heavy vacuum gas oil from mixed Middle East and Venezuelan crudes. Products are paraffin, naphthene, and aromatic hydrocarbons with sulfur contents of less than 1 ppm in the gasoline range and a few ppm in distillates. The only troublesome products are hydrogen sulfide and ammonia, which are treated by amine absorption and sour-water stripping. The principal equipment includes a feed drum, charge pump, feed-effluent exchangers, feed heater, two reactors operated in series, high and low-pressure separators, a recycle compressor, a debutanizer and a fractionator, condensors, and reboil heaters. Utilities required are electric power, 5490 kw; steam, 250 psig, 18,700 lb/hr; cooling water, 1090 gpm; and fuel, 169 million Btu/hr. The unit is operated from control consoles and requires less than three men/shift.

26367 **APTIC NO. 48180**

Hori, Shoichiro

SULFUR DIOXIDE DISPOSAL METHOD. (Aryusangasu no shorihoho). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-48112. 5p., Dec. 4, 1972. 1 ref. (Appl. May 31, 1963, 1 claim).

When sulfur dioxide contained in stack gas or other waste gas is usually removed by scrubbing it with a water solution of ammonia and other ammonium compounds, the desulfurization efficiency is as high as 97% in some cases, but there arises the problem of white fume, the product of NH3 having absorbed SO2. Removal of the fume is very difficult. This invention offers a solution to the problem of the white fume and gives a higher recovery rate of SO2. This invention suggests the addition of water to the waste gas to moisten it sufficiently so that no white fume may be produced when the gas is later treated with an ammonia solution. After being moistened sufficiently as above, the gas is scrubbed with the water solution of ammonia or ammonium compounds for removal of SO2 contained.

26368 **APTIC NO. 47857**

Ikemori, Kametsuru

ON THE CONVERSION OF COLLECTION EFFICIENCY OF DUST COLLECTORS. (Shujin sochi no seino kansan). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 143. (Nov. 7-9, Paper 98.)

The relationships between the quantity of dusts or fumes and the dust collection rate were investigated on various types of dust collectors. The collection rate increases when the dust quantity increases for centrifugal collectors and scrubbers; the reverse effect occurs for bag filters. The relationship Q/Qn:P/Pn (Q equals quantity, P equals filtering rate) was examined and the results were presented in formulas and graphs. Indexes expeessed in figures were 0.05 and 0.16 for scrubbers, minus 1/3 to 1/2 for cyclone collectors with a relatively small cylinder case, and for bag filters, depending on the weaving of filter fibers and density, the index varied between 1 and 1.5.

26369 **APTIC NO. 47853**

Imayoshi, Toshio and So Kawasaki

IDEA OF PREDUSTER, DAMPER, AND SUCTION HOOD SEAL FOR DUST PREVENTION OF CONVEYOR, CRUSHER, AND SCREEN. (Yusoki, Hasaiki, furui no bojin taisaku ni okeru suikomi fudoshiru, puredasuta, danpa no koan). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 144. (Nov. 7-9, Paper 99.)

As an economical solution of transportation, crushing, and handling of dust-creating material, the control of dust emissions and dust collection were devised by combining a suction hood, a hood seal, a preduster, and a damper. The sealing devices using rubber rings and rubber plates and a suction device are installed in the belt conveyor, especially where material is transferred or the duct is bent. The dusts settling in the duct are easily taken out, for the duct is sectionalized, especially at the bend. The movable dust collection hood can be moved anywhere in the dust collection system where emission is heavy. A preduster collects large particles with a small amount of air at the connection hood and where the dusts fall from high places. In order to prevent clogging of ducts and friction at the bends, a screw-type preduster is installed. An air-tight butterfly damper is used in order to facilitate sectional suction operations. The closing and opening of the damper is achieved by electricity or air pressure.

26370 **APTIC NO. 48098**

Jones, Allen A.

THEORY AND APPLICATION OF FABRIC DUST FILTERS. Pit Quarry, 65(3):110-111, 120, Sept. 1972.

Cloth bag filters have virtually 100% collection efficiency for all dusts regardless of particle size. Dust filtration by these filters consists of a primary phase in which dust particles attach themselves to individual fibers in loose chains, and a secondary phase during which dust piles up on the filter surface in a cake thick enough to act as its own filtering medium. This cake restricts flow and must be removed by shaking, pulse-jet cleaning sometimes allows very small particles to migrate through the filter medium. Reverse air cleaning minimizes this problem and can be used with woven or felt cloths, the two main types of cloth used to filter particulates. Woven cloths are made from natural and synthetic fibers, while felt cloths are made almost exclusively from synthetic fibers. Dust filter applications fall into four main categories: low temperature (below 180 F); high temperature (180-500 F); high moisture; and small particulate. High moisture is one of the main problems in dust filtration because condensation can completely ruin filter bags. Nomex cloth is commonly used in this application.

26371 **APTIC NO. 48184**

Kamino, Yasumi, Shigenori Onitsuka, and Kenji Yasuda

A STUDY ON DESULPHURIZATION OF FLUE GASES BY THE ACTIVE CARBON PROCESS USING STEAM DESORPTION (PART 3)-VARIATION OF PROPERTIES OF ACTIVE CARBON USED ON A TEST PLANT. Buil. Japan Petrol. Inst., 14(2):141-146, Nov. 1972. 6 refs.

Physical and chemical properties were studied of a sample of activated carbon taken from a desulfurization test plant employing steam desorption. Surface area and pore size distribution were measured, in addition to total oxygen content, adsorption of benzoic acid, and diphenylguanidine. During the continuous 1200-hour run, the porous structure of activated carbon developed, and the BET surface area expanded slightly. Total oxygen content also increased, reaching 17.6 wt% or over two times of that in the original carbon. A decrease in the amount of basic surface groups and an increase in acidic surface groups were observed. The adsorptive capacity of the activated carbon for SO2 was influenced by the chemical properties of surface oxides and not structural properties. (Author summary modified)

26372 **APTIC NO. 48185**

Kamino, Yasumi, Kenji Yasuda, Shiro Inoue, and Shigenori Onitsuka

A STUDY ON DESULPHURIZATION OF FLUE GASES BY THE ACTIVE CARBON PROCESS USING STEAM DESORPTION (PART 4)-DETERIORATION AND REGENERATION OF ACTIVE CARBON. Bull. Japan Petrol. Inst., 14(2):147-152, Nov. 1972. 4 refs.

To clarify the causes for deterioration of the sulfur dioxide adsorptive capacity of activated carbon, environmental conditions of varying gas composition and temperature were investigated. Exposure to oxygen at a temperature of about 300 C had considerable influence on the SO2 adsorptive capacity of activated carbon. It is thought that the compounds existing on the surface of the activated carbon are oxidized by the oxygen, thus causing a decrease in basic groups and an increase in acidity. Deteriorated carbon can be regenerated to regain the initial adsorptive capacity by heating at a high temperature in an environment with an inert gas or reducing gas, causing a decrease in acidity and an increase in basic groups.

26373 **APTIC NO. 48235**

Katsovashvili, Ya. R.

PROVIDING FOR THE URBAN THERMAL POWER PLANT NEEDS IN LOW SULFUR MAZOUT BY APPLICATION OF THE HYDROCRAKING METHOD ELABORATED BY THE INSTITUTE OF PETROLEUM CHEMISTRY AND SYNTHESIS OF THE USSR ACADEMY OF SCIENCES. (Obespecheniye potrebnosti gorodskikh TETs v malosernistom mazute pri ispol zovanii metoda gidrokrekinga INKhS AN SSSR). Text in Russian. Teploenergetika, no. 10:11-13, Oct. 1972. 5 refs.

The hydrocracking method for the production of low-sulfur oil from crude oil and mazout for thermal power plants is described. Direct single-stage hydrocracking at a pressure of 150-210 kg/sq cm is not suitable for the desulfurization of residues to below 0.5%, while a low-pressure method using 30 kg/sq cm pressure is applicable to crude and residues alike. The rate of fuel output is applicable to crude and residues alike. The rate of fuel output is 29.3% of the crude, and the sulfur content of the product is limited to 0.5%, irrespective of the initial sulfur content. The sulfur content in the product can be adjusted from about 0.35 up to 1% by mixing products with different sulfur contents. The low-sulfur mazout thus obtained contains practically no ash, vanadium or other harmful contaminants.

26374 **APTIC NO. 47912**

Kawamura, Keita and Shinzi Aoki

APPLICATION OF IONIZING RADIATION TO DESULFURIZATION OF FLUE GAS. (Haien datsuryu eno hoshasen riyo ni kansuru kenkyu). Text in Japanese. Nippon Genshiryoku Gakkaishi (J. At. Energy Soc. Japan), 14(11):597-599, Nov. 1972. 2 refs.

The reduction of sulfur dioxide concentration in the heavy oil combustion gas by means of the radiation of radioactive rays was studied. This experiment adopted the batch system. A gas from B-type heavy oil combustion whose SO2 concentration was maintained at about 1000 ppm was enclosed in a reactor subjected to ionizing radiation. A linear type electron ray accelerator was used as the radiation source. The concentration of SO2 was measured using the Kigagawa-type gas detector. Aerosols were collected by suction on a filter; fluorescent X-ray analysis and infrared spectrometric analysis were employed for elements determination. The rate of reduction of SO2 by the radiation of electron rays depended upon the energy of the electron rays, the temperature of the reaction, and the concentration of SO2. Under proper conditions, 80 to 90% desulfurization is possible by radiation of about 3 Mrad electron rays.

26375 **APTIC NO. 48178**

Kishida, Toshio

THE MANUFACTURING METHOD OF FREE-CUTTING STEEL AND THE COLLECTION OF GENERATED SMOKE AND HARMFUL GASES. (Hatsuen yugaigasu o shushusuru kaisakuko no seizohoho). Text in Japanese. (Daido Steel Co. Ltd., Nagoya (Japan)) Japan. Pat. Sho 47-48768. 3p., Dec. 8, 1972. 2 refs. (Appl. July 23, 1969, 1 claim).

This offers an improved manufacturing method of free-cutting steel while completely collecting smoke and other harmful gases generated when such additives as sulfur, tellurium, calcium, or their alloys are added to the molten steel during the manufacturing process. In the improved method a ladle with molten steel is moved and placed at a suitable place by a ladle crane. A hood combined with a duct which is free to turn or slide is brought over the ladle. A turbo-blower is then operated to suck in air through the hood. An inert gas such as argon or nitrogen is blown into the ladle through a pipe connected to a porous brick set in the bottom of the ladle. As the inert gas ascends, bubbling, through the molten steel, the molten steel is stirred and the slag covering the entire surface of the molten steel is partially broken through to make that portion of the molten steel directly exposed. Additives are then thrown through this exposed portion by means of gravity, compressed air, or inert gas. The additives thrown in are stirred by the inert gas bubbles that keep ascending, and are thus distributed thoroughly in the molten steel. During this process, part of the additives react with the steel to produce harmful gases, soot, and dust, which are, however, all collected by means of suction through the hood/duct device.

26376 **APTIC NO. 48080**

Kiyoura, Raisaku and Milton Munidasa

TECHNICAL MEANS TO REDUCE AIR POLLUTION. Bull. Tokyo Inst. Technol., 108(10):177-191, Oct. 1972. 10 refs.

Transportation, industries, and other fuel combustion processes emit air pollutants, including sulfur compounds. To meet increased energy consumption needs and stringent air quality standards for sulfur dioxide, new pollution control methods are needed. Oil desulfurization, flue gas desulfurization (absorption, alkalized alumina, limestone injection, dry dolomite injection and wet scrubbing, manganese oxide, activated carbon adsorption, alkaline scrubbing, ammonia, vanadium oxide, and catalytic oxidation processes), and changing power generation technology or switching to low-sulfur fuels are discussed. Desulfurization of stack gas can be economical if by-products such as SO2, sulfuric acid, and ammonium sulfate are produced. High stacks are mentioned.

26377 **APTIC NO. 47888**

Kuragano, Taketoshi, Eijiro Yagyu, Masato Kodama, and Takushi Harada

REMOVAL METHOD OF HYDROGEN CYANIDE CONTAINED IN A GAS. (Gasuchu no shiankasuiso jokyoho). Text in Japanese. (Osaka Gas Co., Ltd. (Japan)) Japan. Pat. Sho 47-47561. 5p., Nov. 30, 1972. 1 ref. (Appl. Oct. 2, 1968, 1 claim).

This process is designed to remove hydrogen cyanide a fuel gas such as coal, petroleum or other gases containing both hydrogen cyanide and hydrogen sulfide prior to treatment of the gas by a wet type desulfurization process. In the conventional process, the gas is scrubbed with an alkaline water solution to fix HCN as thiocyanate and remove it. Powdered or colloidal sulfur must be supplemented intermittently or continuously while maintaining alkalinity at a fixed level at the same time, thus requiring considerable labor and expense. In the new process, a gas containing HCN and H2S is scrubbed with an alkaline water solution containing an organic oxygen-transmitting substance such as picric acid or metanitrophenol. When the gas is scrubbed with this kind of alkaline solution, part of the H2S is first converted to sulfur by the action of the oxygen transmitting substance. This sulfur in its nascent state reacts with H2S to continuously produce polysulfide, which quickly fixes the HCN as thiocyanate. Therefore, the new method gives higher efficiency and economy compared with the conventional method using sulfur additives. Although an alkaline solution containing either an organic or inorganic oxygen transmitting substance is applicable, the one containing an organic type is much more advantageous in that it can stand the adverse effects of HCN much longer without deteriorating.

26378 **APTIC NO. 47891**

Kuragano, Taketoshi, Nobuhiko Okada, Hiroyuki Ninomiya, Hirobumi Shibano, Makihiko Mori, and Yoshiaki Harada

REFINERY METHOD OF FUEL GAS-CONTAINING AIR POLLUTANTS. (Kogaiseibun o fukumu nenryogasu no seiseihoho). Text in Japanese. (Osaka Gas Co., Ltd. (Japan)) Japan. Pat. Sho 47-47841. 7p., Dec. 2, 1972. 1 ref. (Appl. Aug. 27, 1969, 1 claim).

A fuel gas refinery method designed to remove air pollutants such as hydrocyanic acid gas, hydrogen sulfide, and ammonia consists of three main processes. In the first process, fuel gas is scrubbed with a circulating water solution of ammonium sulfide in which sulfur particles are suspended, thereby converting HCN to thiocyanate. In the second process, while the gas discharged from the HCN removal tower is refined by the usual refining processes including NH3 saturation, naphthalene scrubbing, benzole absorption, dry type desulfurization and water scrubbing, the H2S contained in the gas is completely removed at the H2S arresting tower of the wet-type desulfurization device which is provided with catalyst for air oxidation. The wet-type desulfurization device is installed before the dry type desulfurizer or after the HCN removal tower. The solution that has absorbed H2S is then led into the regeneration tower where it is oxidated with air fed to produce sulfur particles. A part of this sulfur suspension is circulated into the H2S arresting tower, while the other part is concentrated and then supplied to the HCN removal tower of the first process whenever necessary. In the third process, a part of the circulating solution coming out of the bottom of the HCN removal tower is diverged for adjustment purposes and removed of the suspended sulfur; then the solution is concentrated and cooled to recover the crystallized ammonium thiocyanate while the concentration tank's steam, containing ammonia, is supplied to the HCN removal tower.

26379 **APTIC NO. 48247**

Kuragano, Taketoshi, Akira Togawa, Kyozo Ikegami, Mineyoshi Sakai, Yoshiyuki Kawashima, Tsuyuko Nishiyama, and Fumio Kaminishizono

METHOD OF REMOVING HYDROGEN CYANIDE CONTAINED IN A GAS. (Gasuchu no datsushiankasuisoho). Text in Japanese. (Osaka Gas Co., Ltd. (Japan)) Japan. Pat. Sho 47-47562. 4p., Nov. 30, 1972. 2 refs. (Appl. Dec. 13, 1968, 1 claim).

In the conventional method of hydrogen cyanide removal a gas such as coal gas, petroleum gas, or stack gas containing both hydrogen cyanide and hydrogen sulfide is scrubbed in the presence of ammonia with an alkaline liquid containing ferrous salt in order to fix hydrogen cyanide as ferro cyanic salt. The new method features a higher removal efficiency of 95-99% against 80-85% of the previous method. Roughly, the new method comprises the conventional hydrogen cyanide removal method mentioned above and an additional process which is the core of this invention. A gas containing HCN and H2S is scrubbed with an alkaline water solution containing a ferrous salt (FeS) to fix H2S as ferro-cyanate for removal of HCN as heretofore. The gas so scrubbed is placed in direct contact, in the presence of ammonia, with an acidic water solution containing ferrous salt for further removal of the remaining HCN. After this second process, the acidic water solution is added and mixed with the above-mentioned alkaline water solution for reuse.

26380 **APTIC NO. 47986**

Kurosawa, Keiji

PRACTICAL EFFECT AND ECONOMICALITY OF WELLMAN LORD METHOD. (Weruman rodo ho no jitsuyo koka to keizaisei). Text in Japanese. PPM (Japan), 3(12):31-38, Dec. 1972.

The Wellman-Lord process is simple, and its equipment is compact in size, compared with its desulfuring capacity, even when high-sulfur content oil is used. When there is no sufficient land available near the stack, absorption equipment can be placed near the stack. Recovery equipment can be set up at a separate place, connecting the two parts with a pipe. It is also easy to set up one recovery plant for several boilers, although absorbing equipment is to be set up for each boiler. Sodium sulfite is cheaper than lime as an absorber. There is correlation between the ratio of elimination of sulfur dioxide and that of sodium hydroxide. If NaOH is increased, elimination of SO2 increases, and power required for its elimination decreases. Conversely, if there is to be complete recovery, the number of absorbing units and power consumption have to be increased. The Wellman-Lord method is more economical than other methods since the byproduct, SO2 gas of high purity can be processed into 98% sulfuric acid. If there is hydrogen sulfide present, sulfur can be recovered by the Claus method. There is no danger of secondary pollution by waste water. With an afterburner there is no danger of localized pollution, since waste gas is well dispersed. It is more economical to adopt the Wellman-Lord method than to use low sulfur content oil.

26381 **APTIC NO. 47821**

Levin, G. M., G. S. Pantelyat, M. A. Kutsyshin, R. B. Goncharova, and T. M. Bublay

WATER SUPPLY FOR ELECTRIC STEEL MELTING FURNACE-EMITTED GAS SCRUBBERS. (Vodosnabzheniye gazoochistok elektrostaleplavilnykh pechey). Text in Russian. Stal, no. 9:866-868, Sept. 1972. 3 refs.

Problems of the water treatment for electric-arc steel smelting furnace scrubbers are described. Such scrubbers retain 90-92% of the fine dust, 84-98% of the hydrofluoric acid, and up to 94% of the sulfur dioxide present in the furnace gas, which along with the retention of other components results in increased mineral salt and suspended matter content in the scrubber water. Various treatments and neutralization of the waste water are required for the recycling of the water within the scrubbing process. The water to be recycled should not contain more than 100-200 mg/l of suspended matter. Analyses of the recycled water a revealed sharp decline in the rate of increase of the salt content in the water by the sixth day of recycling, which is due mainly to the precipitation of calcium silicate and fluoride. It is possible to increase the specific load of the cyclone to 3 cu m/sq m/hr by combined magnetic and chemical coagulation by means of 1 mg/l of polyacrylamide.

26382 **APTIC NO. 48121**

Maeda, Isamu

ADSORPTION DEVICE WITH CONTINUOUSLY MOVING ADSORBENT LAYER. (Renzokuidoshiki kyuchakusochi). Text in Japanese. (Sumitomoto Shipbuilding Machinery Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-46265. 4p., Nov. 21, 1972. (Appl. Dec. 10, 1970, 1 claim).

This adsorption device for sulfur dioxide features an adsorption tower designed to ensure the uniform and smooth moving of the active carbon layer so that the used active carbon may be continuously and uniformly replaced with a fresh supply while continuing the operation. In the new adsorption tower, the adsorbent (active carbon) is packed up in the center compartment partitioned or encircled by the louvers installed vertically in the interior of the tower. This center compartment is tapered upward and has the lower part shaped like a hopper or funnel. This special design has been devised to prevent the so-called center cave-in phenomenan of the moving layer, that is, the central portion of the layer usually falls much faster than the other portions, especially those along the internal wall surface of the packup compartment, when the compartment is shaped otherwise. A roof-like triangular baffle structure mounted on the upright board is rected in the funnel-shaped bottom part of the compartment. The adsorbent discharge port is provided on the center of the bottom and connected to the desorption or regeneration tower provided below the adsorption tower, using a pipeline. With this setup, the active carbon in the compartment falls down uniformly whether it happens to be located in the central or circumferential part of the layer. This enables all the used active carbon to be replaced with fresh carbon in an orderly and uniform fashion. The used active carbon regenerated in the desorption tower is fed back into the adsorption tower from above.

26383 **APTIC NO. 48258**

Maerzendorfer, Hans

THE THERMAL POWER PLANTS IN THE ENVIRONMENTAL PROTECTION AGE. (Thermische Kraftwerke im Zeitalter des Umweltschutzes). Text in German. O.Z.E. (Oesterr. Z. Elektr.), 25(9):348-354, Sept. 1972. (Presented at the Verband der Elektrizitaetswerke Oesterreichs Meeting, Salzburg, Austria, June 13-16, 1972.)

Environmental problems of thermal power plants in Austria are outlined. As the potential hydraulic power generation capacities are nearly exhausted, the increased energy demand will have to be met mostly by thermal power plants. Fly ash separation at coal-fired power plants is technically possible by means of electrostatic dust precipitators with efficiencies reaching up to 99.5%. Sulfur dioxide emissions constitute, however, a more or less unsolved problem technically and economically. The desulfurization of coal is technically unsolved, and that of heavy fuel oil is associated with technical difficulties and high expenditures. Dry methods for flue gas desulfurization have low efficiencies. Fuel oil desulfurization and the use of low-sulfur fuel under inversion conditions represent promising solutions of practical interest. Nitrogen oxide emissions from thermal power plants are negligible in comparison with exhaust nitrogen oxide emissions. Thermal pollution due to thermal power plants can be abated by means of open-cycle gas turbines to be used only for peak shaving due to their high operation costs, and by means of steam turbines with efficiencies of 35-40%. Long-distance heating is more advantageous by means of separate heating plants than by utilizing the waste heat from thermal power plants.

26384 **APTIC NO. 48295**

Mangion, Charles

FLUIDIC SYSTEMS MAY IMPROVE COMBUSTION IN AUTOMOTIVE ENGINES. NASA Tech. Brief, no. B72-10250:1-2, Sept. 1972.

A proposed fluidic system for automotive engines requires no moving parts to accomplish preheating and mixing of air-fuel mixtures. The system would bypass the air-fuel mixture into a heated loop during periods of incomplete combustion (e.g., cold engine). Bypass control would be accomplished by allowing air from a bias port to entrain on the fuelpair stream and to divert it into the heated loop. When the engine is hot enough to support more complete combustion, one of the two bias ports would be closed, thereby establishing a direct route from carburetor to cylinder. The system would lead to improved combustion efficiency by permitting a leaner carburetor adjustment.

26385 **APTIC NO. 47933**

Matsumoto, Hiroji

ON THE ANTI-CORROSION OF POLLUTION CONTROL EQUIPMENT. (Kogai boshi sochi no boshoku ni tsuite). Text in Japanese. O.C.P. Gijutsu Nyusu (O.C.P. Technol. News), no. 7:288-292, July 1972.

If any of anti-pollution equipment made of iron is to be lined for a rust-proofing purpose, material such as phenol resin, epoxy, phenol, and aromatic amine hardened epoxy are recommended as the construction material, when the equipment is exposed to temperatures exceeding 80 C. Between 60 C and 80 C, besides the above materials, polyester, pure epoxy, epoxytar, natural rubber, synthetic tar and PP can be used. At less than 60 C, besides the above materials, polyvinyl chloride (PVC) can be used. If the equipment is made of synthetic resin, at 120 C-150 C, KERA may be used; at 100 C-120 C, KERA and Fran FRP; at 60 C-100 C, KERA, Fran FRP, polyester FRP, KERAVERIN and PP; at less than 60 C, besides these materials, PVC can be used. Concrete structures for anti-pollution equipment may be lined with polycrete and flake glass polyester lining for withstanding acid, and for withstanding alkali, epocrete can be used. However, these synthetic resins have their merits and demerits, and no one material alone is all-purpose. Suitable materials should be selectively used depending upon the conditions of corrosion. New technology and materials are needed to avoid corrosion.

26386 **APTIC NO. 48130**

Matsumoto, Takanobu, Kozo Egi, Keiichi Inoue, Yutaka Hinuma, Hiroyuki Nishikata, Yasuhiro Takemura, Reiji Aisawa, Satoru Kobayashi, Akio Tsuneya, and Kiichi Shimizu

HYDRODESULFURIZATION METHOD OF HEAVY-QUALITY HYDROCARBON OIL. (Jushitsu tankasuiso yu no suisokadatsuryu ho) Text in Japanese. Ministry of International Trade and Industry (Japan). Public Nuisance Resources Research Inst.) Japan. Pat. Sho 47-44001. 3p., Nov. 7, 1972. (Appl. June 14, 1968, 1 claim).

Studies were made to find a more efficient hydrodesulfurization method for heavy quality hydrocarbon oil performed under high pressure using a catalyst. The best result in the hydrodesulfurization is obtained when porosity of r-alumina, the catalyst carrier, is 0.4-0.8 ml/g and the total volume of 50-100 Angstroms pores accounts for 75% or more of total volume of all pores available in the carrier, all other conditions being equal. Using a catalyst with the r-alumina carrier of the above porosity specifications, the hydrodesulfurization method removes 70% or more of sulfur content from heavy-quality hydrocarbon oil. In a practical case where molybdenum oxide-cobalt monoxide catalyst with the r-alumina carrier of 0.47 ml/g and 84% for the porosity specifications were used, the desulfurization efficiency was 83%. In another case where the porosity figures were 0.76% ml/g and 80%, respectively, the desulfurization efficiency was 80%.

26387 **APTIC NO. 48255**

Matsuyama, T., M. Aoki, and H. Terai

DESULFURIZATION OF SMOKE BY THE ELECTRICALLY DESORPTIONABLE ACTIVE CARBON METHOD (II). (Denki datchaku shiki kasseitan-ho ni yoru haien datsuryu ni tsuite) Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 135-136, 1972. (Presented at the Japan Society of Chemical Engineering, Autumn Conference, 6th, Tokyo, Japan, Nov. 27-30, 1972.)

With a glass tube capable of filling about 2 kg of active carbon (4 to 6 meshes grain size), the adsorption of sulfur dioxide in smoke, the desorption of the adsorped SO2, and the regeneration and continuous use of the active carbon were tried. The smoke, made by burning of the city gas, was mixed with SO2 and was measured with a flow meter to a concentration of about 0.5%. It was passed for 4 hours at a flow rate of 10 to 30 cm/sec through a glass tube 96 mm in inside diameter and 1000 mm in length. The active carbon filled the tube for a 60 cm layer. The concentration of SO2 at the input and output was determined by a gas chromatography. The desorption was carried out by application of a 20 to 40 volts voltage to the electrodes and by measuring the temperatures at three points with thermocouples. The desorbed gas components were analyzed with gas chromatography. After completion of the desorption, the temperature was lowered to about 100 C and again adsorption took place. The result was that a big concentration of SO2 can be easily adsorbed in a short time, but since the active carbon is considerably deteriorated, its adsorption capacity was decreased gradually when used in succession.

26388 **APTIC NO. 47839**

Matteson, Michael J., Hugh L. Stringer, and Walter L. Busbee

CORONA DISCHARGE OXIDATION OF SULFUR DIOXIDE. Environ. Sci. Technol., 6(10):895-901, Oct. 1972. 16 refs. (Presented at the American Institute of Chemical Engineers, National Meeting, St. Louis, Mo., May 20-24, 1972.)

Sulfur dioxide (500-3000 ppm) in a flowing humid air mixture was exposed to a corona discharge in a wire-to-cylinder reactor. Sulfuric acid mist was precipitated on the inside wall-electrode, and ozone and the remaining SO2 were monitored at the exit port. Residence times, humidity, oxygen, and SO2 concentrations were varied to study the kinetics of the conversion of SO2 to acid mist. The reaction was zero order with respect to SO2 in the range tested, and the rate-determining step was the formation of atomic oxygen by the electrical discharge. Optimum reaction rates occurred at 70% relative humidity and above 15% oxygen concentration. The precipitated droplets had a mean size of 6.36 micron before deposition. The information obtained from this study can be applied to electrostatic precipitation of SO2.

26389 **APTIC NO. 48009**

Meyers, R. A., J. W. Hamersma, J. S. Land, and M. L. Kraft

DESULFURIZATION OF COAL. Science, 177(4055):1187-1188, Sept. 29, 1972. 8 refs. (Presented at the American Institute of Chemical Engineers, National Meeting, 71st, Symposium on the Desulfurization of Coal, Dallas, Tex., Feb. 22, 1972 and at the American Geophysical Union, All-Union Session on Coal Conversion and the Environment, Washington, D. C., April 19, 1972.)

Coal combustion is the largest source of sulfur oxide pollution. Treatment of some major representative U. S. coals with an aqueous ferric solution removed 40-75% of the sulfur through near quantitative oxidation of the pyritic sulfur contained in the coal matrix. Elemental sulfur and iron sulfate were recovered as products of the reaction. When fully developed, the system will offer a high potential for the economic abatement of sulfur oxide pollution. Some details of the method, termed the Meyers process, are given. (Author abstract modified)

26390 **APTIC NO. 47987**

Morimoto, Masayuki

EFFECT ON REDUCTION OF FLUE DUST BY FUEL ADDITIVE IN OIL FIRED BOILERS. (Baijin gensho no tame no tenkazai no koka) Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 24(11):32-42, Nov. 1972.

The addition of barium and barium carbonate proved to be effective in decreasing flue dust from industrial boilers, but not so effective in the case of smaller boilers. Using the additive, the flue dust, even during a soot blow, was 60-70% eliminated. With the continuous addition of 1/1500 Ba additive nitrogen oxides decreased about 17% and oxygen decreased 1.0%. With the resumption of O2, NOx and dust went back to the previous volume. With increased additive and decrease in O2, it is possible to lower NOx by 20%. Since there is so much variation in the type of boiler and volume of dust, it is difficult to arrive at a universal formula. The degree of activation of barium oxide is greatly influenced by temperature, staying period, diameter of remaining carbon particles, and volume of remaining carbon of heavy oil. If the volume of remaining carbon and diameter of aerosol particles remain constant, the effect of the additive is influenced by the temperature of boiler and the chemicals remaining period inside the flue. In the case of diesel engines, more than five times the amount of additive is required in order to get the same rate of decrease in dust as in the case of boilers.

26391 **APTIC NO. 47867**

Nagai, Shigeo

ECONOMICALITY AND EFFECT OF SODA SULFITE GYPSUM METHOD. (Zryuso- sekkoho no keizaisei to koka) Text in Japanese. PPM (Japan), 3(12):45-51, Dec. 1972.

The sodium sulfite-gypsum method of desulfurization of stack gases has many merits. Since it is closed system, there is no danger of secondary pollution by waste water. No slurry is used as an absorbent, so that desulfurization is stabilized and complete. The rate of desulfurization is more than 95%, and the concentration of sulfur oxides at the stack outlet is 50 ppm. The absorption process can be separated from other processes, so that land can be used effectively. Also, no pretreatment is necessary. The absorption tower requires little space, and there is very little pressure loss. Dust elimination by this method is about 70%, and with a de-mister, more than 80%. Gypsum, its byproduct, is still in demand; with centrifuge dewatering, the water content of the cake is about 10%, which can be used both as cement and gypsum board, after drying. The estimate of treatment cost of 200,000 N cu m/hr, with 80% annual operation rate, would be about $5.60/kl, if gypsum is to be sold at transportation cost only. After the success of a 10,000 N cu m/hr pilot plant for 10 months, 520,000 N cu m/hr capacity equipment is being constructed at the Chiba Power Generation Plant.

26392

APTIC NO. 47886

Nagata, Katsuya

OCCURRENCE OF CONDITIONS IN A BOILER, AND CONTROL METHODS BY EMITTED-GAS ROTATION DOUBLE COMBUSTION. (Nensho sochi ni okeru chissoankabutsu no hassei to seigyo taisaku). Text in Japanese. Nippon Kikai Gakkai-shi (Journal of the Japanese Society of Mechanical Engineers) (Tokyo), 75(643):1923-1300, Aug. 1972. 5 refs.

Heavy oil combustion in a boiler was modified by combining the emitted-gas rotation and double combustion methods. At a constant air fuel ratio, less soot was produced. Nitrogen oxides were detected under ordinary combustion conditions; the NOx concentration was 1.2 with a normal air fuel ratio. By reducing the amount of oxygen and by lowering the combustion temperature, NOx could be reduced. In the double combustion method, when the overall air fuel ratio was less than 1.3, a fair reduction of NOx occurred. But when the overall air fuel ratio became higher than 1.3, NOx increased more than during ordinary combustion. In the emitted-gas rotation method, the two air fuel ratios were 1.00 and 1.21. In both cases, NOx was reduced and the emission ratio increased. Compared to the double combustion method, a low NOx rate was obtained by emitted-gas rotation; it is proper for combustion to have an emitted-gas rotation ratio between 20 and 40%. Even in the case of the combination of the emitted-gas rotation and double combustion methods, the emitted-gas rotation showed a very positive effect in lowering NOx. An extreme rotation of the emitted-gas aggravated combustion and gave additional soot. The ordinary combustion soot amount increased rapidly at a low air fuel ratio, but decreased during emitted-gas rotation.

26393

APTIC NO. 47993

Nakagawa, Shikazo

ECONOMICALITY OF LIME GYPSUM METHOD AND PRACTICAL EFFECT. (Sekkai-Sekkoho no keizaisei to jitsuyo koka). Text in Japanese. PPM (Japan), 3(12):25-30, Dec. 1972. 9 refs.

The ratio of increase in the demand for cement, plaster board, and plaster is 8-10% a year. Gypsum is the only possibility as byproduct of desulfurization. The lime-gypsum method is simple, compared with other methods, requiring only cleaning and absorbing smoke with the lime slurry, eliminating sulfur oxides, and recovering gypsum by air oxidizing to lime sulfite. This method is very economical. The cake produced from the scrubbing and dust elimination process is used as fence material, after mixing it with cement. Even if scale is formed during the absorption process, it can be separated from the slurry, crushed to help form gypsum, and good quality gypsum can be obtained. Gypsum slurry which comes out of oxidation tower contains big crystals. When condensed by a centrifuge, the gypsum slurry coming out of oxidizing tower contains less than 10% water and is suitable for cement and plaster board. The filtered liquid and scrubbing water can be utilized for preparing the lime liquid. Therefore, there is no waste water to be disposed of from the entire process. With 100% calcium oxide, 221 kg/hr raw material, 2.5 cu m/hr water, and 285 KW/hr electricity are required; 16 t/day of gypsum is recovered.

26394

APTIC NO. 47972

Nakao, Shozo

ON EFFECTS OF SMOKE DUST-REDUCING ADDITIVE. (Baijin genshozai no koka ni tsuite). Text in Japanese. Preprint, Japan Heat Management Assoc., Tokyo, p. 41-52, 1972. (Presented at the Conference of Japan Heat Management Association, 13th, Tokyo, Japan, Oct. 18-20, 1972, Paper 5.)

A new additive was developed to reduce soot and other dusts of the smoke discharged from boilers. Although full details on the chemical composition of the additive have not been disclosed, it is generally known that its three main components are m-alkyl benzene sulphonate plus chelate compounds, alkyl methacrylate-Dialkyl amonoethyl methacrylate, and naphthene hydrocarbon. The amount of the additive was varied in the test in order to find the most suitable volume ratio between the fuel and the additive. The possible increase of heavy metal content in the smoke due to use of the additive was examined. The applicability of this additive to waste oil combustion was also examined. With addition of the additive amounting to 1/2000th of the fuel in terms of volume ratio, the smoke dust was reduced by 70-80%. Nitrogen oxides of the smoke slightly decreased, but no decrease in sulfur oxides was recognized. The dust-reducing effect took place shortly after the additive was added. Addition of the additive caused no increase in the heavy metal content of the smoke. The additive was also effective when used with waste oil.

26395

APTIC NO. 48254

Nerihaya, N. and K. Otsuka

THE ELECTROSTATIC COHESION EFFECT AND DUST COLLECTING CHARACTERISTICS OF A COMBINED SYSTEM OF TWO-STAGE ELECTROSTATIC DUST COLLECTING EQUIPMENT AND A REAR CYCLONE. (Nidangata denki shujin sochi to kochi saikuron no kumiawase hoshiki deno seiden gyoshu koka to shujin tokusei). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 39(12):1178-1184, Dec. 1972. 3 refs.

Experimental and field tests were made of the combined electrostatic dust collector and rear cyclone system. Tests were made at the boiler for a large-scale, heavy oil steam power generation and at a boiler for recovering black liquid for kraft pulp manufacturing. The principle of this system is that fine particles are first coagulated electrostatically by the two-stage electrostatic dust collecting equipment and the coagulated particles are next collected centrifugally by the rear cyclone. In the experiment, the two-stage type and one-stage type were used in order to obtain an effective dust collection volume necessary for obtaining a dust collecting rate of 88% in treating the same gas volume at 130 C. The effective dust collection volume of the two-stage can be reduced by half as compared with that of the one-stage type. For the pressure loss, the two-stage becomes higher than the one-stage type, about 70 mm for the two-stage, 15 mm for the one-stage. The two-stage type at the black liquid recovering boiler demonstrated that a dust collecting rate of more than 90% can be attained for soot dust in the combustion of heavy oil and for a fume of sodium sulfate. The system with the two-stage type was very effective in collecting submicron dust or a fine fume of several g/N cu m.

26396

APTIC NO. 47984

Neumann, Klaus-Kurt

EQUILIBRIUM CALCULATIONS FOR THE COMBUSTION CHAMBER IN A CLAUS PROCESS FOR SULPHUR RECOVERY. (Thermodynamische

Berechnung fuer die Brennkammer von Claus-Anlagen zur Schwefelgewinnung). Text in German. Erdoel Kohle (Hamburg), 25(11):656-659, 1972. 11 refs.

Calculations of the chemical simultaneous equilibria were made for feed gases, temperatures, and pressures which are usual for the combustion chamber in the Claus process. The effect of these variables on the yield of sulfur is discussed. For components which are present in very small concentrations in the flue gas, the order of magnitude is given for the mol-fractions. The entrance gases in Claus plants are of various compostion. The influence of the water and carbon dioxide concentration of four different entrance gases on the equilibrium formed in the combustion chamber is presented in a table for 1400 C and 1 bar. The methane burns entirely, ammonia hardly occurs, and nitrogen oxides are formed in equilibrium concentration of less than 1 ppm, the same holds for sulfur trioxide. The equilibrium concentration for carbon disulfide also remains low. The carbonyl sulfide concentration remains below 1 mol% but represents 1/5 of the sulfur still present in the gas in form of hydrogen sulfide. The concentration of the reducing component hydrogen is relatively high in all cases, that of the reducing component CO carbon monoxide only when the carbon content of the mixture is sufficiently high. Both concentrations rise with increasing temperature. In a second and third table the mass effect constants and the reaction enthalpies of the reverse reactions are given for the following two reactions: 4 water + sulfur yields $4H_2$ + 2 sulfur dioxide, and $4CO_2$ plus S_2 yields 4CO plus $2SO_2$. The equilibrium composition for a total pressure of 1 bar for three different entrance gas compositions is plotted in three graphs dependent on the temperature between 800 C and 2500 C. The influence of the pressure on the conversion to S_2 reveals that a pressure increase reduces the S_2 yield. The water fraction in a Claus gas also reduces the S_2 yield.

26397 APTIC NO. 48105

Nicklin, Gordon T.

THEORY AND APPLICATION OF WET SCRUBBERS. Pit Quarry, 65(3):115-117, 120, Sept. 1972.

The general operating characteristics of the following types of wet scrubbers are described: washers, spray chamber scrubbers, centrifugal scrubbers, venturi scrubbers, impingement scrubbers, wet filters, packed towers, film towers, scrubbers with rotating elements, and Doyle scrubbers. Power, pressure drop, and water requirements of each scrubber type are noted, and examples of their applications are given. The use of sensible heat condensation treatment to increase collection efficiencies is discussed. In general, wet scrubbers are limited to the collection of particulate matter larger than 1 micron. The capital cost of low pressure drop equipment ranges from 10-35 cents/cu ft/min for normal construction materials to $1-$1.50/cu ft/min when special materials are required. The capital cost of high pressure drop units is 50 cents to $1.50/cu ft/min for normal construction materials and can be as high as $3.50/cu ft/min for special materials.

26398 APTIC NO. 47913

Niimiya, H., T. Inui, and J. Takahashi

A STUDY OF TOTAL CONVERSION ENGINEERING OF A FIXED BED FLOW SYSTEM IN A TUBE-TYPE INTEGRATION REACTOR - APPLICATION TO THE COMPLETE CLEANING OF CAR EXHAUST. (Koteisho ryutsukei no kangata sekibun hannoki ni okeru kanzen henkan kogaku no kenkyu - Jidosha haiki no kanzen joka ni taisuru oyo). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 233-234, 1972. (Presented at the Japan Society of Chemical Engineering, Autumn Conference, 6th, Tokyo, Japan, Nov. 27-30, 1972.)

In designing a tube-type integrated reactor for the fixed bed flow system on the basis of the total conversion engineering, it is essentially important not only to enlarge the activity and contact time of the catalyzer, but also to elucidate the real nature of the individual particles of a solid catalyst with respect to inherent activity and at what transfer rate reacting components in the gas reach the catalyst particles. For the total conversion engineering in this case, the detail of the contact time is of the most importance, but the contact time per volume of the catalyst is reasonable to deal with prior to making clear the true effective contact time. This consideration can be linked to the reacting components which flow regardless of catalyzer particles (inner reaction), called the blowby, which creates a remarkable advantage in the catalytic reaction engineering with respect to mass transfer and heat transfer in a heat reaction. The blowby system based on the total conversion engineering is most effective in order to make the catalytic activity best in a short contact time with less loss. The catalyst for the removal of nitrogen oxides, carbon monoxide, and hydrocarbons showed a total conversion.

26399 APTIC NO. 47991

Nohira, Hidetaka

ON NITROGEN OXIDES IN AUTOMOBILE EXHAUST GAS. (Jidosha haikigasu chu no chissosankabutsu ni tsuite). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 11(131):77-87, Nov. 1972.

The Clean Air Act of 1970 set up control criteria for hydrocarbons, carbon monoxide, and nitrogen oxides 0.41, 3.4, and 0.4 g/mi, respectively, with regard to automotive emission. Various experiments using Toyota automobile engines were conducted to find a solution to this problem, particularly the nitric oxide emission. A considerable proportion of the emission was recorded during the startup warming stage. The four-mode test indicated that the major proportion of the NO_x emission was recorded during the accelerating operation. Factors influencing the NO_x emission of a gasoline engine included air/fuel ratio, ignition timing, shape of the combustion chamber of the engine, exhaust gas recirculation (EGR), composition of fuel, and effect of ambient temperature. The air/fuel ratio and ignition timing affect the NO_x emission most. The NO_x emission was examined by changing the air/fuel ratio and ignition timing while keeping the engine s revolution and intake pipe negative pressure at a constant level. The lowest NO_x emission was obtained when the ignition timing was somewhat delayed and the air/fuel ratio lower or higher than the theoretical one, provided the developed power output is put aside. But when the same level of developed power, output should be maintained, the air/fuel ratio does not help much, causing new problems. The flat shaped combustion chamber seemed more suitable. Fuel containing more aromatics tends to give higher NO_x emission, and no-lead fuel tends to contain more aromatics. Engine modification, control of the ignition timing, EGR system including the above-the-throttle-valve EGR and below-the-throttle-valve EGR are discussed.

26400 APTIC NO. 48226

Nyvelt, Friedrich

HYDRAULIC POWER PLANT BUILDING AND THE ENVIRONMENTAL PROBLEM. (Wasserkraftausbau und Umweltproblem). Text in German. O.Z.E. (Oesterr. Z. Elektr.), 25(9):341-347, Sept. 1972. (Presented at the Verband der Elektrizetaeswerke Oesterreichs Meeting, Salzburg, Austria, June 13-16, 1972.)

General environmental problems involved in the building and operation of hydraulic power plants are reviewed with special regard to the specific situation in Austria. Hydraulic power plants, though causing absolutely no pollution during operation, require certain, not necessarily negative, changes in the environment for the construction. Such projects may serve as a starting point for overall land development, and may become places of interest for tourists.

26401 **APTIC NO. 47892**

Ogasawara, M., T. Takashiro, and K. Fujii

CALCULATION OF THE EFFECT OF A SECONDARY AIR ADMIXTURE ON THE CONCENTRATION OF CO, NOX, AND HC. (SECOND REPORT). (CO, NOX, HC nodo ni oyobosu jinikuki konnyu koka no santei). Text in Japanese. Preprint, Japan Combustion Research Group, p. 124-127, 1972. 3 refs. (Presented at the Combustion Symposium, 10th, Tokyo, Japan, Dec. 1-2, 1972.)

The effects of the temperature of the combustion gas, the amount of secondary air, and the air/fuel ratio on pollutants such as methane, formaldehyde, nitrogen oxides, and carbon monoxide were examined for automobile engines. And in this experiment, a model of the secondary air admixture and its method of calculation were established. For this purpose, CH4 equaled 1000 ppm and NOx equaled 500. The induction period of CO was extended as the temperature level decreased but CH4 oxidation continued at 900 K when the oxidation of CO cannot be seen. Formaldehyde was rapidly formed in a stage when CH4 began to decompose, and gradually was reduced and disappeared when CH4 was gone. When the secondary air was not introduced, pollutants were discharged almost unchanged, but as the secondary air increased, their reaction became active. At first, CH4 alone was oxidized, then the oxidation of CO began; but at the air fuel ratio 2/1, as CO approached the equilibrium concentration the change in concentration became slow. In general, the reaction was most rapid near 2/1; with increasing air, the reaction began to slow down. Regardless of the amount of secondary air, formaldehyde showed the maximum concentration when CH4 was reduced by about 20%. These experimental results agreed well with those obtained from the method of calculation.

26402 **APTIC NO. 48262**

Ohara, Kiyoshi, Takao Uesaka, Seiichiro Nozu, Akira Azuma, and Tomiharu Kamatani

STUDY ON PYROLYSIS AND BURNING PROCESS OF OIL ASH. (Genjuyu susu no kanryu shokyaku shori no kenkyu). Text in Japanese. Preprint, 41p., 1972. (Presented at the Thermal Power Meeting, Japan, Oct. 1972.)

Cooperative research has been conducted since June 1971 for development of a pollutionless treatment method of fuel oil soot, and satisfactory results have been obtained. By this method, soot is dry distilled and ammonia sulfide is taken out from the gas in crystal form; the ammonia is recovered. Fly ash is burned by a pollutionless method and vanadium and nickel can be recovered from the ashes. Soot from various electric power plants are collected and sent to a hopper, fed by a chain feeder, and sent to the dryer by a flow conveyor. Partially dried soot is sent to the dry distillator, and distillated ashes are thrown into the incinerator by a paddle mixer conveyor. The combustion gas exchanges heat with the combustion air supply, and passing through the outer pipe of the furnace, further contributes heat to the dryer. The gas then goes to the absorption tower and is scrubbed by ammonia water and goes out the exhaust pipe. Distillated gas goes to water-wash crystallizer, where ammonia sulfide is eliminated. A distillation gas fan pushes the gas into the incinerator. The steam coming from the distillation furnace goes through a cooler and enters the incinerator. Approximately 35% of the sulfur in the material soot remains in the distillated ash, and 83% of it is solidified in a gypsum form when lime is mixed and the ash-lime mixture is burned at 1000 C. The combustion gas contains about 17% sulfur in sulfur dioxide (188 ppm), and is washed by ammonia. Ammonia sulfide is separated by a centrifugal separator.

26403 **APTIC NO. 48071**

Osada, Kyoichi and Harutoki Nakamura

AUTOMOTIVE EXHAUST GAS CLEANER. (Jidosha haikigasu jokasochi). Text in Japanese. (Matsushita Electric Industrial Co., Ltd., Kadoma (Japan)) Japan. Pat. Sho 47-46256. 3p., Nov. 21, 1972. (Apr. July 30, 1970, 1 claim).

This catalyst-type automotive exhaust gas cleaner features a heating system incorporated to heat the catalyst to its working temperature. Effective cooling of the catalyst prevents excessive temperature rise during use. The catalyst with a chopped glass strand carrier comes in a sheet form. This sheet of the catalyst is wound around the punched internal pipe connected to the exhaust pipe. A few sheets of the catalyst may be used to make a laminated layer of the catalyst on the pipe. A filter cloth prevents outside dust from getting inside. Use of a spacer between the outer surface of the internal punched pipe and the first layer of the catalyst is recommended for reduction of the exhaust gas resistance or improvement of the gas flow. A similar spacer may be used also between the filter and the outer punched pipe for the same purpose. The catalyst is heated electrically with the nichrome heater at the beginning of operation until the temperature rises high enough for the catalyst to react. When the catalyst begins to react, the heater is turned off. Then the catalyst is effectively cooled with air. Compared with a sealed type cleaner, this cleaner kept the catalyst temperature lower by 450 C when used to clean an exhaust gas containing carbon monoxide.

26404 **APTIC NO. 48169**

Preszler, Laszlo and Tamas Lajos

THE UNIFORMITY OF VELOCITY DISTRIBUTION AT THE ENTRY OF A FLOWING GAS INTO AN ELECTROSTATIC PRECIPITATOR. (Die Gleichmaessigkeit der Geschwindigkeitsverteilung beim Eintritt eines stroemenden Gases in ein Elektrofilter). Text in German. Staub, Reinhaltung Luft, 32(11):431-436, 1972. 9 refs.

The electrostatic precipitator reaches the highest possible collection efficiency only with a uniform flow velocity across the entire filter cross section. The air jet entering the diffusor of the electrostatic precipitator with high speed must be slowed uniformly across the entire filter cross section until it reaches the collection electrodes. This slow-down can be achieved either by conducting the flow through a slowly widening canal, or by the use of perforated walls or wire meshes. The effectiveness of these methods for achieving a uniform flow velocity was tested on a model 1/5 the size of the electrostatic precipitator. The flow velocity was measured with a Prandtl tube. Good results were obtained with a distribution grid consisting of 51 divisions. Denser divisions and an additional grid installed in the diffusor brought no further improvement. The mounting of a perforated wall to the distribution grid yielded the most favorable velocity distribution. For construction reasons, it is better to install the perforated plate without the distribution grid. The velocity distribution suffers only slightly. Throughout all experiments with various insertions for influencing the flow velocity, the pressure loss in the model changed very little. The largest increase of the pressure loss was less than 6% without perforated plates or guide vanes.

26405 **APTIC NO. 48088**

Ramans, Gunars J.

SCRUBBERS FOR AIR POLLUTION CONTROL. Plant Eng., 26(19):116-118, Sept. 21, 1972.

Scrubbers can be used to control both gaseous and solid pollutants. The most commonly used scrubbers are spray towers, spray cyclones, submerged nozzles or baffles, venturi scrubbers, and trays. Efficiencies of scrubbers change with variations of factors such as quantity of dust in the scrubber inlet, density of particles, wettability, and particle configuration. Scrubber efficiencies are listed for various types of scrubbers and various applications. Scrubber materials must be chosen to withstand corrosion from the collected pollutants. The choice of a scrubbing liquid is usually dictated by the process and liquid availability. If the clean gas steam is discharged directly into the atmosphere, a steam plume results which can impair visibility. Cooling can eliminate such a plume. Less commonly used scrubbers are packed towers, wetted filters or wetted beds, dynamic scrubbers, jets, sonic scrubbers, packed beds, and venturi jets.

26406 **APTIC NO. 48365**

Rolke, R. W., R. D. Hawthorne, C. R. Garbett, E. R. Slater, T. T. Phillips, and G. D. Towell

AFTERBURNER SYSTEMS STUDY. Shell Development Co., Emeryville, Calif., Office of Air Programs Contract EHS-D-71-3, EPA-R2-72-062, S-14121, 347p., Aug. 1972. 218 refs.

NTIS: PB 212560

Afterburner and fume incinerator technology was studied for the control of gaseous or gas-borne particulate combustible emissions from stationary sources. Current engineering technology, existing afterburners, present practices and problems, major sources, potential applications, and research recommendations are evaluated. Thermal and catalytic afterburners are considered for the control of odor, smoke, hydrocarbons, and carbon monoxide. Afterburners are typically used to control low-concentration combustible emissions. Heat recovery, costs, afterburner performance, construction, operating variables, construction materials and corrosion, control and safety, combustion mechanisms and kinetics, burner types, and sources are discussed. Afterburner performance can be measured by analyzing hydrocarbons, oxygenated organic compounds, CO, carbon dioxide, chlorinated hydrocarbons, hydrochloric acid, nitrogen oxides, sulfur dioxide, sulfur trioxide, particulate matter, sulfuric acid, and odors in the stack gas by a variety of analytical methods. Sampling considerations and instrument calibration are also mentioned.

26407 **APTIC NO. 47998**

Rollo, W. G. and A. O Grady

VAPOR DEGREASING CAN REDUCE POLLUTION. Can. Mach. Metalwork., 83(11):76, 94, Nov. 1972.

In metal cleaning, grease, oil, wax, or tar can be removed from metal parts by suspending them in a tank that contains the vapor of a boiling chlorinated solvent. This process, vapor degreasing, can cause air pollution by emitting solvents such as trichloroethylene, a photochemically reactive compound capable of contributing to smog. To comply with air pollution legislation, vapors can be eliminated by control equipment, a different method of cleaning can be used such as alkaline washing, or a non-restricted solvent can be used as the degreaser. The use of 1,1,1 trichloroethane to replace trichloroethylene has increased, and has resulted in over-all cost savings as well as compliance with air quality standards. Properties including thresholds and maximum allowable concentrations are listed for the solvents 1,1,1 trichloroethane, trichloroethylene, and perchloroethylene.

26408 **APTIC NO. 47815**

Ruth, Lawrence A., Arthur M. Squires, and Robert A. Graff

DESULFURIZATION OF FUELS WITH HALF-CALCINED DOLOMITE: FIRST KINETIC DATA. Environ. Sci. Technol., 6(12):1009-1014, Nov. 1972. 12 refs. (Presented at the American Chemical Society, 161st Meeting, Los Angeles, Calif., March 1971.)

Kinetic data are given for the first time for the reaction of half-calcined dolomite with hydrogen sulfide (550-800 C, 0.005-0.2 atm of H2S in gas at 1 atm). The reaction can be used to remove H2S from a fuel gas made by gasifying coal with air and steam at high pressure. Gas at 20 atm from a dilute-phase slagging gasifier can be desulfurized in an operation at about 920 C to reduce the sulfur dioxide emission from power generation to roughly that expected from coal containing 0.15% sulfur. Gas at 20 atm from an ash-agglomerating fluidized bed gasifier can be desulfurized to an even greater extent in an operation at about 760 C. In light of data given here for 700 and 800 C, the reaction can be expected to proceed to completion under these conditions at a faster rate than that afforded by the reaction of fully calcined dolomite, reported earlier. Data at lower temperatures reveal kinetic curiosities which may prove important to understanding of the reverse reaction, useful in regenerating half-calcined dolomite and releasing H2S. (Author abstract)

26409 **APTIC NO. 48179**

Saigo, Kazuo

METHOD FOR RECOVERING CONVERTER EXHAUST GAS BY MEANS OF BLAST FURNACE GAS. (Korogasu ni yoru tenro no haigasu kaishuho). Text in Japanese. (Sumitomo Metal Industry Co., Osaka (Japan)) Japan. Pat. Sho 47-48762. 2p., Dec. 8, 1972. (Appl. March 31, 1969, 1 claim).

This invention describes a method in which high-pressure blast furnace gas is utilized to recover the reusable converter exhaust gas. The furnace gas pressure of a high-pressure blast furnace is higher than that of an ordinary blast furnace, so that the blast furnace gas gives 1-2 kg/sq m when taken out of the furnace. Because this blast furnace gas pressure is still higher than that of an ordinary blast furnace gas even after being processed through a venturi scrubber for removal of dust, it has to be lowered in pressure by means of a septum valve before the gas is sent into the gas holder. On the other hand, the converter exhaust gas has to be increased in pressure to 300 mm Hg for storage in the gas holder. In a modern ironworks, it is not unusual that the flow quantity of the blast furnace gas is much greater than that of the converter gas, the ratio often reaching 5-6 to 1. Making use of this relation between the two, the converter gas is increased in pressure by means of the blast furnace gas. Both gases are then mixed together, thereby recovering the converter gas. To do this, the blast furnace gas as cleaned and decreased in pressure is sent through the jet exhauster into the gas holder while the converter gas supplied through a three-way valve by a small-capacity exhaust gas fan is fed into the jet exhauster in order that it may be sucked and increased in pressure with the energy of the blast furnace gas and mixed with the blast furnace gas for storage in the gas holder.

26410 **APTIC NO. 48205**

Salooja, K. C.

COMBUSTION CONTROL BY NOVEL CATALYTIC MEANS. Nature (London), 240(5380):350-351, Dec. 8, 1972. 4 refs.

Combustion control by flame catalysis is discussed. Flames can be strongly catalyzed, provided that the catalysts are introduced in specific flame zones. Flame catalysis is a method that can control the formation of carbon and nitrogen oxides; the catalyst itself does not pollute the atmosphere since it is not introduced as an additive with the fuel-air stream to discharge with the flue gas, but is held in the flame. Inhibition of carbon formation occurs when catalysts -- metals and metallic compounds -- are placed in the primary reaction zone of the flame, and promotion occurs when they are inserted in the pyrolysis zone. Nitrogen oxides are reduced when catalysts are introduced in the zone immediately downstream of the primary reaction zone, near the hottest part of the flame. Effects are not restricted to a particular type of flame, whether premixed or diffusion, and are observed with every type of hydrocarbon fuel. Laboratory tests were conducted to study the influence of catalyst position in the flame and the effects of various catalysts. Principal observations and conclusions are presented. Suitable catalyst systems are being developed for field applications.

26411 **APTIC NO. 48214**

Sawada, Seiji

DESULFURIZATION METHOD OF GAS CONTAINING HYDROGEN SULFIDE. (Ryukasuiso o fukumu gasu no datsuryu hoho). Text in Japanese. (Japan Soda Co., Ltd.,

Tokyo) Japan. Pat. Sho 47-46254. 2p., Nov. 21, 1972. (Appl. Feb. 20, 1970, 1 claim).

A fuel gas containing hydrogen sulfide emits not only an offensive odor but also sulfur dioxide when burned. According to this invention, hydrogen sulfide can be removed very efficiently from such fuel gas, leaving carbon dioxide, when a solution of sodium carbonate and sodium bicarbonate whose pH level is kept at 10-11 is used as the absorbent. When the same absorbent is kept at pH 7.5 lower, the sulfur becomes separated for recovery. When kept in contact with a fuel gas containing hydrogen sulfide, the mixture solution of sodium carbonate and sodium bicarbonate decreases in pH level as it absorbs the hydrogen sulfide, thus giving lower desulfurization efficiency. Therefore, caustic soda or a large quantity of sodium carbonate should be added from time to time in order to maintain the pH level at 10-11 at all times. Part or all of the absorbent may be continuously removed and neutralized to pH 7.5 or lower by adding a gas containing CO2, after which it is cooled forcibly or otherwise for separation of sulfur. Crystals of sodium carbonate or sodium bicarbonate that become separated, together with sulfur, can be used to adjust or manufacture the absorbent while the mother solution, free of sulfur and sodium carbonate or bicarbonate, may be concentrated for uses as the adjusting solution or in the absorbing solution.

26412 APTIC NO. 48096

Schneider, H. J. and Robert L. Price

POLLUTION: COPE WITH IT OR AVOID IT PART 2--AIR POLLUTION. Ind. Finishing (Indianapolis), 48(10):12-14, Oct. 1972.

Many parts of the country are adopting Los Angeles County Rule 66 to control air pollution from metal cleaning and pretreatment operations. Under this rule emissions from bake-cured organic compounds must be reduced by 90% or else must not exceed 15 lb/day/machine. Photochemically reactive solvents emissions must be reduced by 85% or else held to less than 40 lb/day/machine. To meet these regulations thermal incinerators must perform at 85% efficiency under varying loads of solvent mixtures and must be able to handle a wide range of organic emissions. Mutiple-stage and multi-purpose scrubbers for organic compounds are being investigated. The multi-purpose scrubbers hold the promise of lower cost, but contaminant reduction of some organic solvents appears impossible. Powder coatings and water-based coatings also help to reduce air pollution problems. Measures that will ensure an efficient control program are outlined.

26413 APTIC NO. 48450

Sham, Indravadan Shantilal

PROCESS FOR THE RECOVERY OF SULFUR DIOXIDE. (Procede de recuperation d anhydride sulfureux). Text in French. (Chemical Construction Corporation, New York) French Pat. 2,095,085. 11p., Jan. 10, 1972. (Appl. June 3, 1971, 7 claims).

A process for the recovery of sulfur from waste gases containing sulfur dioxide and sulfur trioxide is described. The waste is scrubbed by an aqueous solution of sodium sulfite. The first fraction of the sodium disulfite solution obtained from scrubbing is regenerated and recycled, while another fraction is treated with solid magnesium carbonate or calcium carbonate (dolomite, dolomitic limestone, magnesite, or limestone) to precipitate magnesium sulfite or calcium sulfite or a mixture thereof. With the precipitate removed, the residual watery solution of sodium carbonate is recycled. The precipitate is heated in reducing atmosphere in the presence of dolomite, dolomitic limestone, limestone, or magnesite to obtain magnesium oxide, calcium oxide, or a mixture thereof, as well as vapors of elementary sulfur, or it is calcinated at a temperature of 400-1200 C to obtain the above oxides and SO2 which latter is then utilized for sulfuric acid production. The SO3 present in the waste gas forms sodium sulfate with the wasn liquid, and is precipitated in the form of magnesium sulfate or calcium sulfate.

26414 APTIC NO. 48223

Skrechko, G. V. and Y. V. Pavliv

THE USE OF EXHAUST CLEANING DEVICE FOR SELF-LOADING TRUCKS. (Primeneniye neytralizatorov otrabotannykh gazov na avtonagruzchike). Text in Russian. Avtomat. Proizvod., no. 9:29, 1972.

Experimental exhaust cleaning equipment discharging nonsparking, low-temperature exhaust as required for indoor operation of self-loading trucks is described. The exhaust gas entering into the catalytic afterburning chamber though the catalyst-coated, permeable chamber wall, is burned at 750 C in the presence of fresh air. With catalyst type ShPK-0.5, the efficiency of the afterburning device is 80-100% for air excess coefficients ranging from 0.85 to 1.1. The purified exhaust gas is mixed with fresh air by an exhaust ejector to obtain nonsparking, low-temperature exhaust, and to prolong the life of the afterburning device.

26415 APTIC NO. 48195

Stoenner, Alfred

OPERATING EXPERIENCES WITH A ROTARY FLOW DUST COLLECTOR FOR DUST REMOVAL FROM COMBUSTION GASES. (Betriebserfahrungen mit einem Drehstroemungsentstauber bei der Entstaubung von Brenngas). Text in German. Energie (Munich), 24(11):282-285, Nov. 1972. 5 refs.

A power plant was equipped with a ceramic filter because the coke exhaust gas was almost dust-free and there was no indication whatsoever that this might change some day. After several years of operation of steady increase of the dust concentration was discernible, at first only with the maximum throughput quantity of 30,000 cu m/hr. Soon, however, the dust quantity rose also at a lower throughput of 10,000 cu m/hr to 1.2 g/cu m. The ceramic filters sometimes reached within 1-1.5 hours their maximum differential pressure due to the high dust load. In order to operate with gas throughputs of 10,000 to 12,000 cu m/hr over an unlimited period, cyclone dust collectors were installed. Grain size analyses of the dust showed that the problem could be solved only with a rotary flow dust collector. Two of them were installed. Their mode of operation is illustrated. These dust collectors are capable of cleaning combustion gases with dust concentrations of up to 2.0 g/cu m.

26416 APTIC NO. 48228

Stopka, Frantisek

PRACTICAL EXPERIENCE WITH THE UTILIZATION OF THE CAUSTICIZING MUD FOR THE PREPARATION OF SULFITE TOWER ACID. (Skusenosti s pouzitim kaustifikacneho kalu na vyrobu vezovej kyseliny). Text in Czech. Papir Celuloza, 27(6):125-127, 1972. 2 refs.

Caustification sludge, a waste product from the manufacture of sulfate cellulose has been used with good results instead of limestone in the manufacture of tower acid by the paper mills in Ruzomberok. The average sludge contains 53.40% calcium oxide, 72% magnesium oxide, 2.65% sodium salts, and 0.57% iron oxide. The CaO content is about the same as in limestone, the MgO content is more favorable than that of limestone which contains 1.61-3.32% MgO. The manufacture of tower acid by the absorption of gaseous sulfur dioxide in a solution of caustification sludge yields hydrogen sulfide, sulfurous acid, calcium sulfite, calcium bisulfite, and sodium sulfite. Sodium sulfite has a beneficial effect on sulfite pulping. Thiosulfate reduces cellulose yield and viscosity and reduces its bleachability. Pulping with tower acid obtained from caustification sludge causes no difficulties and no negative effects on cellulose yield or on its physical and mechanical characteristies. The principal advantages are smaller SO2 losses due to good absorption of the gas by the causticizing sludge avoidance of the cumbersome handling of lumpy limestone, and improved pulping.

26417

APTIC NO. 48222

Timpe, W. G. and W. J. Evers

ST. REGIS HYDROPYROLYSIS RECOVERY PROCESS – A NEW APPROACH. Paper Trade J., 156(43):48-49, Oct. 16, 1972. ((Presented at the Technical Association of the Pulp and Paper Industry, Alkaline Pulping Conference, 1972.)

The hydropyrolysis process, a new approach to kraft recovery, is described. Hydropyrolysis consists of two systems: a process system in which organics and inorganics are separated, and the inorganics converted to a desired form; and the heat-recovery system in which a power boiler burns the organics and recovers heat values. The conventional kraft recovery furnace is replaced by the standard power boiler. The hydropyrolysis process concepts and operation are discussed. The new process will tend to minimize air pollution problems because the major source of reduced sulfur compounds and the emissions of the smelt dissolving tank are eliminated. Capital investment savings and expenditures are considered. An experimental program to establish the technical validity of the hydropyrolysis process is reviewed.

26418

APTIC NO. 47917

Ukai, Naomichi

TRIAL OF A POLLUTION FREE FOUNDRY. (Mukogai chuzo kojo o mezashite). Text in Japanese. Imono (Foundry), 44(12):1106-1113, Dec. 1972.

In order to improve the working environment of a foundry, in the past 10 years many new ideas were adopted at Mizuho Foundry, perhaps at the risk of sacrificing facilities which would improve productivity. It is a jobbing foundry, and not a mass production one using a conveyer system. Much care was taken in rationalizing transportation within the plant and melting process and in improving the working environment. Ventilation and lighting, both natural and artificial, are good. Many types of dust collectors are used. Since the manned type of crane is not popular in foundries, where the top layer of air is very hot, all the cranes are of the whist type, button operated, and cranes overlap each other. No heavy oil is used any more, but melting is carried out with electricity and butane gas as energy sources, so that hardly any smoke or sulfur dioxide is emitted. The flat cars for transportation, which used to be operated by wire ropes, are now self-propelling.

26419

APTIC NO. 47948

Utzig, Helmut and Ulrich Dieterle

THERMAL REGENERATION OF CORE AND SHELL SANDS. (Thermische Regenerierung von Kern- Und Maskensanden) Text in German. Giesserei (Duesseldorf), 59(20):607-611, Oct. 1972. 1 ref. (Presented at the Fachausschuesse Form -und Hilfsstoffe und Giessereimaschinen und -einrichtungen im Verein Deutscher Giessereifachleute, Ludwigshafen, West Germany, Dec. 9, 1971.)

The thermal regeneration method to reuse waste sands can be especially adapted for resin-bound sands, since it makes use of the reaction of the resin combustion and at the same time provides for a cleaning of the grain surface. The process is effected in a shaft furnace which works on the counter current principle and consists of a grate through which the combustion air passes. The shaft furnace is heated up to the regeneration temperature of 800 C and then utilizes the heating value of the sand lumps so that the subsequent process is effected without using other energy sources. The regenerated sand passes through the grate, falls onto a screen, and then falls onto a cascade separator and vibration tube where it is cooled to 150 C and dedusted. The utilization of thermally regenerated sands has several advantages: reduced mixing time, better processability of the sand and a considerable reduction of sand expansion errors at high quantities of added sand. The gases developing during the described process are led through a cyclone which cleans them till the dust content is only 100 mg/cu m. The concentration of carbon monoxide is 0.4 vol%, that of carbon dioxide is 2.5 vol%. The development of nitrogen oxides is 18 mg/cu m, that of ammonia 140 mg/cu m. The plant and the chimney meet the technical requirements for keeping the air clean.

26420

APTIC NO. 48265

Vandermar, Bert C. and Leonard E. Fron

AUTOMOTIVE ELASTOMER NEEDS IN THE ERA OF ENVIRONMENTAL CONTROLS. Lubric. Eng., 28(10):412-415, Nov. 1972. (Presented at the American Society of Lubrication Engineers, Annual Meeting, 27th, Houston, Tex., May 1-4, 1972.)

Emission control devices and low-lead fuels have increased automotive engine operating temperatures and caused the premature deterioration of elastomer seals and gaskets in the fuel pump/carburetor system, the automatic transmission system, and the cooling system. Of the improved alternative elastomers for the three systems, fluorocarbon rubber compounds show the highest heat resistance and greatest retention of original properties.

26421

APTIC NO. 48417

Weisburd, Melvin I.

KRAFT PULP MILLS. In: Field Operations and Enforcement Manual for Air Pollution Control. Volume III: Inspection Procedures for Specific Industries. Pacific Environmental Services, Inc., Santa Monica, Calif., Office of Air Programs Contract CPA 70-122, Rept. APTD-1102, p. 7.2.1-7.2.30, Aug. 1972. 15 refs.

Kraft mills present a complex air pollution problem in terms of the variety and volumes of contaminants emitted. The major problems are odors and particulates. The malodorous contaminants are inherently objectionable and persistent at low concentrations, are non-condensible and hence difficult to control, and are emitted in large quantities. Major sources of pollution in a Kraft mill are concentrated in the cooking of the pulp and recovery of the process chemicals. Processes and inspection points are discussed. Controls are considered for pulp cooking, while weak black liquor oxidation, black liquor oxidation, and strong black liquor oxidation are considered for initial chemical recovery. Controls are also considered for final chemical recovery. The environment in the vicinity of Kraft mills should be periodically surveyed for odors and damage to vegetation and materials, and these findings correlated with public reactions in neighboring communities and with specific mill operations wherever possible. Odor thresholds are given for Kraft mill gaseous sulfur compounds in air.

26422

APTIC NO. 48418

Weisburd, Melvin I.

ANIMAL RENDERING. In: Field Operations and Enforcement Manual for Air Pollution Control. Volume III: Inspection Procedures for Specific Industries. Pacific Environmental Services, Inc., Santa Monica, Calif., Office of Air Programs Contract CPA 70-122, Rept. APTD-1102, p. 7.3.1-7.3.22, Aug. 1972. 2 refs.

Odors present the principal air pollution problem from rendering, drying, and refining of animal matter. Dust from blood drying, meal grinding, and handling are secondary problems. Malodors emanate from most animal matter operations, especially from rendering cookers. Emission rates from the various equipment units and systems found in rendering operations are given. Processes, controls, and inspection points are discussed. Controls for the reduction or elimination of odors from inedible animal matter processing are usually condensation, high temperature incineration, scrubbing, carbon adsorption, or a combination of these methods. Odor threshold concentrations of selected rendering compounds are presented.

26423 **APTIC NO. 48419**

Weisburd, Melvin I.

STEEL MILLS-FURNACES. In: Field Operations and Enforcement Manual for Air Pollution Control. Volume III: Inspection Procedures for Specific Industries. Pacific Environmental Services, Inc., Santa Monica, Calif., Office of Air Programs Contract CPA 70-122, Rept. APTD-1102, p. 7.4.1-7.4.20, Aug. 1972. 3 refs.

Emissions from steel mills occur primarily from charging, oxygen blowing, and tapping operations, and take the form of smoke, fumes, dust, and carbon monoxide. Particulates include, principally, iron, silicon, manganese, and phosphorus oxides. Processes, emissions, inspection points, and controls are discussed. Blast furnaces, electric steel furnaces, open hearth furnaces, and basic oxygen furnaces are included.

26424 **APTIC NO. 48421**

Weisburd, Melvin I.

PETROLEUM INDUSTRY. In: Field Operations and Enforcement Manual for Air Pollution Control. Volume III: Inspection Procedures for Specific Industries. Pacific Environmental Services, Inc., Santa Monica, Calif., Office of Air Programs Contract CPA 70-122, Rept. APTD-1102, p. 7.6.1-7.6.67, Aug. 1972. 10 refs.

Operations of the petroleum industry can logically be divided into production, refining, and marketing. Processes and the air pollution potential of petroleum equipment are discussed. Refining equipment, waste-gas disposal systems, storage vessels, loading facilities, catalyst regeneration, oil-water effluent systems, valves, and cooling towers are included, as well as a number of miscellaneous sources such as airblowing, blind changing, equipment turnarounds, tank cleaning, vacuum jets, and compressor engine exhausts. Pollutants include hydrocarbon vapors, hydrogen sulfide, particulates, sulfur dioxide, and nitrogen oxides. Inspection points and process inventories are considered. Controls, design criteria, and maintenance factors are mentioned. Control methods include flares, vapor recovery, adsorption, proper operation, and floating roofs.

26425 **APTIC NO. 48423**

Weisburd, Melvin I.

PRIMARY AND SECONDARY NON-FERROUS SMELTING AND REFINING. In: Field Operations and Enforcement Manual for Air Pollution Control. Volume III: Inspection Procedures for Specific Industries. Pacific Environmental Services, Inc., Santa Monica, Calif., Office of Air Programs Contract CPA 70-122, Rept. APTD-1102, p. 7.8.1-7.8.50, Aug. 1972. 6 refs.

The smelting and refining of non-ferrous metals are primarily concerned with the production of copper, lead, zinc, and aluminum ingots and alloys. Primary smelters usually constitute large, difficult to control single sources of air pollution, are usually located outside of urban areas, and can be significant sources of visible emissions and plant damage. Secondary smelters are commonly found in industrial and urban areas, close to sources of scrap and other raw materials generated by population centers. They are significant sources of pollution, as well as local public nuisance problems. Sources of emissions, processes, and inspection points are discussed for primary and secondary non-ferrous smelting and refining. Roasting, reverberatory furnaces, converters, and contaminants emitted are included for copper production. Sintering, blast furnaces, refining, and contaminants emitted are included for lead production. Roasting, sintering, extraction, and contaminants emitted are included for zinc production. Operations and equipment for reclaiming metals from scrap, drosses, and slag are considered, for brass and bronze, lead, zinc, and aluminum. Smoke, dust, fumes, sulfur oxides, fluxing, and degreasing agents are typically emitted.

26426 **APTIC NO. 48424**

Weisburd, Melvin I.

FERROUS AND NON-FERROUS FOUNDRIES. In: Field Operations and Enforcement Manual for Air Pollution Control. Volume III: Inspection Procedures for Specific Industries. Pacific Environmental Services, Inc., Santa Monica, Calif., Office of Air Programs Contract CPA 70-122, Rept. APTD-1102, p. 7.9.1-7.9.31, Aug. 1972. 4 refs.

The products of the ferrous and non-ferrous metallurgical industries are oriented to consumer or industrial use while smelters and refiners provide alloys in ingot form to be used by the foundries. While furnaces and melting practices have long been treated as major sources of air pollution from foundries, other operations also contribute. Among these are core making, sand handling, grinding, buffing, and plating. Melting operations produce smoke and condensed fumes while the other operations produce dust, mists, organic gases, and vapors. Processes and inspection points are described for grey iron foundries, as well as for copper-base alloys, aluminum, and zinc foundries.

26427 **APTIC NO. 48425**

Weisburd, Melvin I.

CEMENT PLANTS. In: Field Operations and Enforcement Manual for Air Pollution Control. Volume III: Inspection Procedures for Specific Industries. Pacific Environmental Services, Inc., Santa Monica, Calif., Office of Air Programs Contract CPA 70-122, Rept. APTD-1102, p. 7.10.1-7.10-10, Aug. 1972. 5 refs.

Processes, emissions and controls, and inspection points are described for the production of Portland cement. Dust loading characteristics are considered for both dry and wet processes. Bag type collectors, electrical precipitators, and multicyclones are in use as dust control equipment.

26428 **APTIC NO. 48427**

Weisburd, Melvin I.

MINING. In: Field Operations and Enforcement Manual for Air Pollution Control. Volume III: Inspection Procedures for Specific Industries. Pacific Environmental Services, Inc., Santa Monica, Calif., Office of Air Programs Contract CPA 70-122, Rept. APTD-1102, p. 7.12.1-7.12.12, Aug. 1972. 2 refs.

The air pollution problem from mining operations involves primarily particulates from suffface operations and combustion contaminants from fires. Additional pollutants are emitted into the ambient atmosphere via the ventilation systems of underground mines. Water contamination may occur as runoff passes through surface mining regions and into nearby bodies of water. The condition of the land after mining is completed is also becoming a major issue to conservationists. Surface mining, including both strip and open-pit mining, is discussed, as well as underground mining. Inspection points are indicated.

26429 **APTIC NO. 48428**

Weisburd, Melvin I.

COAL PREPARATION PLANTS. In: Field Operations and Enforcement Manual for Air Pollution Control. Volume III: Inspection Procedures for Specific Industries. Pacific Environmental Services, Inc., Santa Monica, Calif., Office of Air Programs Contract CPA 70-122, Rept. APTD-1102, p. 7.13.1-7.13.20, Aug. 1972. 6 refs.

Air pollution control problems from coal preparation plants include dust, smoke, hydrogen sulfide, sulfur oxides, various odors from burning refuse piles, and other particulate emissions. Common processes which create dust and particulates are cleaning processes, sizing, drying, refuse, and storage. Emissions, controls, inspection points, environmental observations, and the various processes are described.

26430 **APTIC NO. 48429**

Weisburd, Melvin I.

FERTILIZER INDUSTRY. In: Field Operations and Enforcement Manual for Air Pollution Control. Volume III: Inspection Procedures for Specific Industries. Pacific Environmental Services, Inc., Santa Monica, Calif., Office of Air Programs Contract CPA 70-122, Rept. APTD-1102, p. 7.14.1-7.14.17, Aug. 1972. 8 refs.

Two major sub-groupings of the chemical fertilizer industry are of particular importance as air pollutant sources and are considered in detail: the phosphatic compounds produced from phosphate rock, and ammonium nitrate produced by the reaction of ammonia with nitric acid. Processes, control methods, and inspection points are considered. Fluorine compounds are usually removed by scrubbers; particulate matter is removed by cyclones, cloth filters, and scrubbers; proper control and ventilation can reduce dust; baghouses and electrostatic precipitators can also be used to reduce pollutants.

26431 **APTIC NO. 48430**

Weisburd, Melvin I.

PAINT AND VARNISH MANUFACTURING. In: Field Operations and Enforcement Manual for Air Pollution Control. Volume III: Inspection Procedures for Specific Industries. Pacific Environmental Services, Inc., Santa Monica, Calif., Office of Air Programs Contract CPA 70-122, Rept. APTD-1102, p. 7.15.1-7.15-18, Aug. 1972. 6 refs.

The paint and varnish manufacturing industry in a fairly broad context could be said to include synthetic resin manufacturing, varnish cooking, and paint blending processes. The major air pollutants from synthetic resin manufacturing would include emissions of monomers and other raw materials from storage and reaction vessels, sublimed phthalic anhydride and oil bodying odors from alkyd resin manufacturing, and possible solvent losses during thinning operations and storage of thinned resins. Varnish cooking involves a wide variety of odorous substances released during the polymerization and other chemical reactions that the natural drying oils enter into during the cooking process. These range from acrolein and other partially oxidized organic compounds to sulfur derivatives. Solvent losses may also occur in the thinning of varnish and in paint blending operations. Processes, air pollution control techniques, and inspection points are discussed. Control techniques include scrubbers, adsorption, flame and catalytic afterburners, and odor counteraction.

26432 **APTIC NO. 48431**

Weisburd, Melvin I.

GALVANIZING OPERATIONS. In: Field Operations and Enforcement Manual for Air Pollution Control. Volume III: Inspection Procedures for Specific Industries. Pacific Environmental Services, Inc., Santa Monica, Calif., Office of Air Programs Contract CPA 70-122, Rept. APTD-1102, p. 7.16.1-7.16.14, Aug. 1972. 1 ref.

The coating of iron and steel materials with zinc to prevent oxidation is a practice commonly found in most industrialized communities. The primary source of air contaminants is the galvanizing kettle containing molten zinc. Processes and inspection points are described, as well as air pollution control equipment.

26433 **APTIC NO. 48432**

Weisburd, Melvin I.

ROOFING PLANTS--ASPHALT SATURATORS. In: Field Operations and Enforcement Manual for Air Pollution Control. Volume III: Inspection Procedures for Specific Industries. Pacific Environmental Services, Inc., Santa Monica, Calif., Office of Air Programs Contract CPA 70-122, Rept. APTD-1102, p. 7.17.1-7. 17.7, Aug. 1972. 1 ref.

Asphalt impregnated paper and felt, which is used extensively in the building trades, is manufactured by means of asphalt roofing saturators. These are high speed continuous processes using still bottoms from petroluem crude oil. The saturators are a major source of vapors, liquid particulates, and steam emissions. Processes, emissions, controls, and inspection points are described. Controls include hoods, scrubbers, cyclones, bag filters, electrostatic precipitators, and maintenance.

26434 **APTIC NO. 48433**

Weisburd, Melvin I.

ASPHALTIC CONCRETE BATCHING OPERATIONS. In: Field Operations and Enforcement Manual for Air Pollution Control. Volume III: Inspection Procedures for Specific Industries. Pacific Environmental Services, Inc., Santa Monica, Calif., Office of Air Programs Contract CPA 70-122, Rept. APTD-1102, p. 7.18.1-7.18.15, Aug. 1972. 5 refs.

Asphaltic concrete batching operations are described, including contaminants emitted and inspection points. As in all operations employing rotating kilns or dryers, entrainment of dust in the products of combustion due to product drying is the primary source of contaminants. Collection and control systems include cyclones, scrubbers, and baghouses.

26435 **APTIC NO. 48172**

Williams, N., G. Srinivasan, and P. Wechselblatt

THE REMOVAL AND RECOVERY OF SULPHUR DIOXIDE FROM POWER PLANT GASES USING MAGNESIUM BASED PROCESSES. Preprint, DECHEMA Inst., Frankfurt (West Germany), 13p. 1972. (Presented at the DECHEMA Conference, Frankfurt, West Germany, June 16, 1972.)

Stack gas desulfurization processes in which magnesium oxide is used to absorb sulfur dioxide are reviewed including the Niiogas Process, Showa Denko Process, Gillo Werke Process, Chemico Process, and Babcock and Wilcox Process. The Chemico process is described in detail and is presented as a method of SO2 removal and recovery which is both technically viable and commercially acceptable. The Chemico process includes a centrifuge system, MgO absorption of SO2 and removal of flyash in a venturi scrubber, a drying system, and a calcination system to regenerate MgO and recover SO2. The principles of this type of operation are conveniently summarized as removal, recovery, regeneration, and recycle. The generation of secondary pollution is avoided, in that there is no discharge of any waste which could present further disposal problems for the plant operator. One central recovery and processing plant using the Chemico MgO slurry process could provide a service for a 5000-7000 MW power plant, thus meeting the requirements of small industries who cannot afford their own separate recovery plant. The desulfurization of stack gases is a likely alternative to the use of low sulfur fuels to reduce SO2 emissions.

26436 **APTIC NO. 48115**

Wise, Clare E.

NINETEEN SEVENTY-THREES ARE HERE. WILL THERE BE ANY 75S? Machine Design, 44(23):20-23, 25-26, 28, 30, Sept. 21, 1972.

The new Federal damageability standard and more severe emission standards imposed new design parameters on 1973 model cars. The cars have costly new bumper structures that add at least 40 lbs to their weight. For the simultaneous reduction of hydrocarbons and nitrogen oxides, auto manufacturers have adopted exhaust gas recirculation. In a typical system, 6-10% of the exhaust gas is metered into the fuel-air mixture entering the intake manifold. The gas acts as a coolant, holding combustion temperatures below the point where nitrogen and oxygen combine to form nitrogen oxides. Further design effort will be required to meet the 1974 damageability standard and 1975 emission standards. Platinum catalysts may achieve the required reduction in emissions, but do not meet the 50,000 miles durability test required of emission control systems.

26437 **APTIC NO. 48143**

Wondraezek, W.

PLANT FOR THE ABSORPTION OF FLUORINE-CONTAINING GASES. (Anlage zur Absorption fluorhaltiger Gase). Text in German. Chem. Tech. (Berlin), 24(8):522-523, Aug. 1972.

A slotted bottom absorber was developed for the absorption of fluorine-containing gases from the fertilizer industry. For satisfactory silicon tetra-fluoride absorption, the slotted bottom has a relatively large slot area with very specific flow velocities in the slots. At a certain spray density, the deposition of fluosilicic acid is avoided. A stable dynamic bubble zone of 1200 mm height is produced which provides the required contact areas for the phases. Single-stage absorbers are used for maximum fluosilicic acid concentration of 15 to 17 mass % and for fluorine concentrations in the scrubbed waste gas of 30 to 50 mg F/cu m; for higher H_2SiF_6 concentrations two-stage systems are used. The absorbers 0presently available are designed for gas throughputs of up to 50,000 cu m gas/hr. Absorbers with waste gas quantities of up to 150,000 cu m are being developed. The operation and construction of a two-stage absorber is described. The waste gas is drawn off from the reactor by a ventilator and passed into the lower section of the first absorber where the fluorine-laden gas rises countercurrent to the washing fluid. After passage of a droplet precipitator, the preliminarily cleaned gas enters the second absorber and passes through it countercurrently to the washing fluid. A cyclone is used as second droplet precipitator where the cleaned gas is pressed into the waste gas duct.

26438 **APTIC NO. 47819**

Yakovlev, G. G.

ON SOME POSSIBILITIES TO ABATE THERMAL POWER PLANT GENERATED EMISSIONS. (O nekotorykh sposobakh umen sheniya vrednykh vybrosov iz dymovykh trub teplovykh elektrostantsiy). Text in Russian. Teploenergetika, no. 10:87-89, Oct. 1972.

Possibilities and trends in the abatement of thermal power plant-generated emissions are reviewed. Particulate emissions are effectively abated by cyclones, multicyclones, electrostatic dust precipitators or by combinatons of cyclone and electrostatic dust precipitators, with efficiencies ranging usually from 95 to above 99%, while there are no economically acceptable techniques for the abatement of gaseous pollutants from power plants. Lime and dolomite additive in scrubbers, watery ammonia solutions or suspensions of manganese and magnesia are used for the removal of sulfur dioxide from flue gases at some power plants. Desulfurization of petroleum products and low-sulfur fuels are increasingly being used. Multiduct stacks with a minimum height of 200 m are used for large power plants. Various methods suitable for the computation of ground-level pollutant concentrations from wind speed and direction, turbulence, and geographic conditions can be used for the siting of power plants and for the design of stacks.

26439 **APTIC NO. 48261**

Yamamoto, Tsuyoshi

ON DEVELOPMENT OF DUST COLLECTORS FOR EMISSION GAS OF CUPOLA FURNACE. (Kyupora haigasu yo shujin sochi kaihatsu ni tsuite). Text in Japanese. Preprint, Japan Heat Management Assoc., Tokyo, p. 71-80, 1972. (Presented at the Conference of the Japan Heat Management Association, 13th, Tokyo, Japan, Oct. 18-20, 1972, Paper 8.)

The regulations specifying criteria for dust concentrations in the emission gases from cupola furnaces were promulgated in June, 1971 and will be effective June, 1973. The criteria are 0.2 g/N cu m for those emitting 40,000 N cu m/hr or more of the gas and 0.4 g/N cu m for those emitting less than that amount. Low-cost dust collectors for cupola furnaces have been developed. Although a bag filter or electrostatic precipitator type is more desirable in view of the grain size distribution of the cupola dust, its high construction cost makes it impractical for use by cupola users who are usually small-scale enterprises. So, the development has been directed along a wet-type of dust collector. Using a test cupola, such fundamentals as the cupola dust concentration, grain distribution, wind volume, carbon monoxide concentration, and gas temperature were studied to obtain the basic data for designing the dust collector. Two models of the dust collector designed for use with the cupola furnace were then introduced, one incorporating the scrubber known as Blue Bird and the other employing the scrubber known as Totem Pole. The former gave the dust removal efficiency of 90% when the dust concentration was 3.5 g/N cu m, and 86% when it was 2.8 g/N cu m. With this efficiency, the dust concentration at the exit of the dust collector ranges from 0.2 to 0.4 g/N cu m. In order to reduce this figure to below 0.2 g/N cu m, the type using the Totem Pole scrubber equivalent to two Blue Bird scrubbers was designed and put in practical use very recently. Although the actual performance data are not yet available for the latter, it is predicted it will achieve the objective of 0.2 g/N cu m or lower dust concentration.

26440 **APTIC NO. 47916**

Yamanaka, Tatsuo

CATALYSTS FOR PURIFYING TOXIC GASES. (Yugai gasu joka shokubai). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 2(8):41-50, Oct. 1972. 8 refs.

The key to the purification of toxic gases by burning is a catalyst. It is especially necessary to dispose of nitrogen oxides which cause photochemical smog. About 60% of the NOx comes from generating plants and factories, 40% from automobiles. For reduction of NOx various flammable gases are used. Catalysts such as platinum and palladium can oxidize thin organic gases. These catalysts can be recycled at a low cost and are very durable. In order to reduce loss by pressure, honeycomb-type catalysts are being used rather than spherical ones. These catalysts do not require a great quantity, and their reaction is very quick. The catalyst layer is first warmed to 200-300 C by a burner, and combustion of toxic gases is started. When 0.1% platinum aluminum oxide is used, the temperature reaches 1000 C sometimes, but this must be avoided, and if possible, it must be operated at less than 500 C, never reaching 900 C. At 300-350 C nitric oxide is sometimes oxidized into nitrogen dioxide, which later is broken down into high concentration NOx to make nitric acid. With this purification method, only a small quantity of heat energy needs to be supplied. Therefore, the higher the emission gas temperature, the less supplementary energy is required. Even when there is hardly any perceptible odor (methyl mercaptan, 0.01 ppm, or acrolein, 1-2 ppm), it is still possible to oxidize them. Carbon dioxide, ammonia, hydrocarbons, and other toxic gases can also be removed by catalytic oxidation.

26441 **APTIC NO. 47870**

Zalogin, N. G. and L. I. Kropp

PROBLEMS INVOLVED IN THE PROTECTION OF THE AIR FROM POLLUTION WITH POWER PLANT-GENERATED GASES. (Problemy zashchity vozdushnogo basseyna ot zagryazneniya dymovymy gazami elektrostantsiy). Text in Russian. Teploenergetika, no. 10:2-4, Oct. 1972. 7 refs.

General problems of the prevention of power plant generated air pollution are described. Increased energy production is expected to cause a larger increase in sulfur dioxide than fly ash output by power plants. Nitrogen oxide emissions create more serious control problems than SO_2. The nitrogen oxide emissions can be limited by applying waste gas recirculation, two-stage combustion, or reduced excess air coefficients. High, large-capacity stacks do not reduce always effectively the ground-level pollutant concentrations around power plants. The use of low-sulfur fuel, and the extensive use of natural gas and remote heating constitute genuine solutions to the emission problems, along with flue gas cleaning which raises the energy costs by 15-25%. The gasification of sulfurous mazut under pressure with the removal of hydrogen sulfide and soot constitutes a solution of practical interest for the USSR.

1971

26442 **APTIC NO. 48335**

(Inventor not given.)

PROCESS AND DEVICE FOR INTERNAL COMBUSTION ENGINE EXHAUST GAS CLEANING. (Procede pour decontaminer les gaz d echappement de moteurs a combustion interne et installation pour la mise en oeuvre de ce procede). Text in French. (Aktiengesellschaft Kuehnle, Kopp und Kausch (West Germany)) French Pat. 2,091,095. 14p., Dec. 20, 1971. 3 refs. (Appl. May 3, 1971, 13 claims).

A device for the purification of internal combustion engine exhaust gases, composed of an exhaust turbocompressor as a vortex generator and a diffusor as an afterburning chamber, is described. The exhaust gas expanded by the turbocompressor which supplies combustion air for both the afterburning chamber and the engine is burned inside the diffusor. One part of both the turbine and of the diffusor is designed as a heat exchanger for preheating the combustion air. The diffusor is provided with adequate means for ignition and flame stabilization.

26443 **APTIC NO. 48349**

(Inventor not given.)

UNIVERSAL MULTI-FUEL DISTRIBUTOR FOR REDUCED EXHAUST EMISSION. (Distributeur polycarburants, anti-pollution, pour tous moteurs). Text in French. (Assignee not given.) French Pat. 2,091,212. 6p., Dec. 20, 1971. (Appl. May 5, 1971, 1 claim).

A multi-fuel distributor, generally usable for any design of internal combustion engines, is described. Proportional air and fuel admission according to the actual mode of operation is applied. A certain percentage of propanediol as an additive is mixed with any fuel used, including water, to reduce harmful exhaust components, and to prolong the life of the engine component parts.

26444 **APTIC NO. 48387**

(Inventor not given.)

ABSORBER FOR HIGHLY CONCENTRATED GASES AND OTHER PRODUCTS. (Absorbeur pour la lavage de produits tels que des gaz a haute concentration). Text in French. ([illegible]uler Industriew[illegible]ke G.m.b.H. (West Germany)) French Pat. 2,089,578. 5p., Dec. 13, 1971. (Appl. April 13, 1971, 5 claims).

An absorber for scrubbing gases with high concentrations of gaseous components such as nitrogen oxides or solid particles is described. The gas to be treated is admitted into a vertical, parallel tube assembly which is submerged in the wash liquid, and which traverses through a horizontal filter plate. The filter plate and the lower end of the tubes lie in the same plane. The perforations in the filter plate have diameters of 3-5 mm. A number of such absorber units are superposed and connected in series for the ascending gas flow.

26445 **APTIC NO. 48389**

(Inventor not given.)

DEVICE FOR THE COMBUSTION OF EXHAUST GAS COMBUSTIBLE COMPONENTS. (Dispositif de combustion des constituants combustibles d un gaz d echappement). Text in French. (Firma J. Eberspicher (West Germany)) French Pat. 2,090,848. 6p., Dec. 20, 1971. (Appl. April 28, 1971, 6 claims).

An afterburning device was designed to reduce unburned components in automotive exhausts. The space swept by the exhaust gases (exhaust manifold) accommodates an afterburning tube held by cross-pieces which at the same time provides turbulent motion for the gases. Supplemental air for the afterburning is admitted in the manifold section before the afterburning tube.

26446 **APTIC NO. 48390**

(Inventor not given.)

PROCESS AND DEVICE FOR THE PURIFICATION OF INTERNAL COMBUSTION ENGINE EXHAUST GAS. (Procede et appareillage pour la purification des gaz d echappement des moteurs a explosion). Text in French. (Assignee not given.) French Pat. 2,087,084. 4p., Dec. 6, 1971. (Appl. May 5, 1970, 2 claims).

A device for cleaning internal combustion engine exhaust gases by exhaust recycling is described. The device is composed of a venturi and a fan for mixing the exhaust gas from the exhaust chamber with fresh air, a bubbler for dissolving the carbon dioxide contained in the exhaust gas, and a recycling duct which conveys the exhaust-air mixture to the engine feed pipe for admission into the combustion chamber where the carbon monoxide contained in the exhaust gas is burned to CO_2.

26447 **APTIC NO. 48002**

Akerkar, D. D. and M. J. Shahani

THE DEVELOPMENT OF HYDROCHLORIC PICKLING OF STEEL IN INDIA. Indian Chem. Eng., 13(3):8-14, July 197[illegible]. 17 refs.

The hydrochloric acid pickling of steel, which is steadily replacing the conventional sulfuric acid method, is of particular interest to India in connection with import substitution, since H_2SO_4 is derived from imported sulfur. Experimental work to develop a process suited to Indian conditions is reviewed. The regeneration of waste liquor and possible production of iron powder as a useful by-product are considered. Techniques for the conversion of existing H_2SO_4 facilities to HCl pickling are described. To eliminate air pollution from chlorine produced by the caustic soda industry, chlorine is converted to HCl. Therefore, a large proportion of the HCl would be available for pickling without causing any extra production effort. Pickling with HCl can result in HCl vapors unless acid concentrations and temperatures are controlled exactly. Iron concentration has little effect on the pickling time, but an increase of iron, temperature, and acid concentration can increase the vapor pressure of HCl.

26448 **APTIC NO. 48328**

Lawrence, William, Richard Muter, Ronald Anderson, and Linda Condry

PILOT SCALE UP OF PROCESSES TO DEMONSTRATE UTILIZATION OF PULVERIZED COAL FLYASH MODIFIED BY THE ADDITION OF LIMESTONE-DOLOMITE SULFUR DIOXIDE REMOVAL ADDITIVES. (FINAL REPORT). West Virginia Univ., Morgantown, Coal Research Bureau, Office of Air Programs Contract CPA 70-66, EPA-R2-72-027, 109p., Oct. 1971. 48 refs.

NTIS: PB 213639

Methods for the potential utilization of fly ash modified by the limestone-dolomite process for fixing gaseous sulfur oxides as solid sulfates were examined in bench-scale experiments. The most promising methods of total utilization of modified fly ash were the production of calcium-silicate and cement-like structural products, high temperature production of materials such as mineral wool insulation, and the use of modified fly ash as a soil stabilizer and amendment. Other investigated fields of utilization included sulfur dioxide regeneration, nucleated ceramic materials, and recovery through flotation. Ash characteristics, laboratory tests, analytical procedures, cost analyses, and process problems and limitations are reviewed. (Author abstract modified)

26449 **APTIC NO. 48170**

Nagata, Katsuya, Fumihiko Kono, and Hiroshi Honma

STUDIES ON GENERATION OF NITROGEN OXIDES IN A BOILER AND ITS CONTROL MEASURES; 1ST REPORT. STATE OF NOX GENERATION IN BOILERS AND ITS CONTROL BY EXHAUST GAS RECIRCULATION TWO-STAGE COMBUSTION METHOD. (Boira ni okeru chissosankabutsu no hassei to sono yokuseitaisaku ni kansuru kenkyu; Dai ippo, Boira ni okeru hasseijokyo to haigasu junkan 2-dan nensho ni yoru yokuseiho). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Kansai Branch, p. 34-37, 1971. 3 refs. (Presented at the Japan Society of Mechanical Engineers, Kansai Branch, Lecture Meeting, 226th, Osaka, Japan, June 8, 1972.)

Nitrogen oxides emission from an industrial-use small-sized boiler was surveyed to find that the NOx emission amounted to 2-6 kg/t of fuel or the same level as reported in the U.S.A. There was a high degree of correlation between the gas temperature in the combustion chamber and the NOx emission; the lower the combustion temperature, the less the NOx emission. The volume ratio of NO against the total NOx was 0.6-0.9, the figure thought to be considerably affected by the in-boiler remaining time. Estimated from the above survey results and heavy oil consumption quantity, the total NOx emission from boilers should amount to 400,000 tons annually, indicating that boilers are NOx emission sources at least equal to or even worse than automobiles. Using a small-sized heavy oil boiler, the exhaust gas recirculation type two-stage combustion was tested to examine its effectiveness for reduction of the NOx emission. The NOx emission cannot be determined simply by the air/fuel ratio but its considerably affected by mixing state of air and fuel in the combustion chamber. The two-stage combustion was effective in reducing the NOx emission when the air ratio was below 1.3. However, when the total air ratio was higher, the NOx emission with the two-stage combustion system tended to increase. Taking the ratio of flow quantity of the recirculating exhaust gas against quantity of air fed into the first combustion chamber as the exhaust gas circulation ratio, effectiveness of the exhaust gas recirculation for NOx reduction was examined. Higher exhaust gas recirculation ratio tended to result in lower NOx emission. The exhaust gas recirculation type two-stage combustion system used in this experiment produced NOx reduction by more than 95%.

26450 **APTIC NO. 48331**

Susuki, Rinnosuke, Syuhei Tanimori, Sadao Toyoda, and Toshiaki Ogoshi

APPARATUS FOR SULFONATION. (Vorrichtung zur Durchfuehrung einer Sulfonierungsreaktion). Text in German. (Lion Fat and Oil Co. Ltd., Tokyo (Japan)) W. Ger. Pat. Appl. 2,138,326. 17p., July 30, 1971. 5 refs. (2 claims).

A sulfonation apparatus was designed to yield a reaction product free from colored by-products, fog, and dust in the exhaust gases usually resulting from imperfect cooling of the strongly exothermic sulfonation reaction. The reaction takes place in an annular reactor space whose inner and outer walls are formed by cooling mantles. The liquid reaction component (a straight-chain alkylbenzene for example) entering the reactor through an annular supply nozzle filled with a porous substance forms an even film on the cooled reactor surface exposed to the action of a uniform stream of diluted sulfur trioxide. The SO3 enters the reactor through a mouthpiece surrounding the liquid phase supply nozzle, which like the nozzle is also filled with a porous material. The uniform and intimate mixing of the two phases at 25 C yielded a colorless sulfonated C16-olefin with a high yield and a very low percentage of disulfonates. The pores of the porous substance should optimally be between 20 and 100 micron in size, smaller pores create too big a pressure gradient, larger pores prevent the formation of an even film of the liquid phase. Arylalkyl hydrocarbons, olefins, aliphatic alcohols, alkyl phenols, their ethoxilates, and other sulfonable organic compounds can thus be successfully sulfonated.

26451 **APTIC NO. 47946**

Takata, Fumisato

DESULFURIZATION OF FLUE GAS BY CALCIUM BASE WET PROCESS. (Calcium-besu shisshiki haien datsuryu ni tsuite). Text in Japanese. Preprint, Japan Society of Thermal Power Engineers, 33p., 1971 (?). (Presented at the Symposium of the Japan Society of Thermal Power Engineers.)

The aluminum refining process at the Miike thermal power plant of the Mitsui Aluminum Industries Co. utilizes a low grade Miike coal containing a large amount of sulfur. With the tightening of regulations concerning sulfur oxide emissions, the wet method, calcium base scrubber was adopted for stack gas desulfurization. After examination of various factors, the plant decided to use two scrubbers with the simplest system, in order to minimize mechanical failure and to avoid the use of a large space. In order to solve the problem of load fluctuation, the system was designed to send a certain percentage of flue gas directly to the stack, bypassing the scrubber. This insures the security of boiler regardless of the load. The use of the low-cost powder carbide as an absorbent helped to keep the cost of operation down. The scrubber is a simple venturi type, and is able to treat up to 25% of load fluctuations. The following parts were designed particularly carefully: the buildup in the piping system, the fly ash accumulation treatment at the entrance of scrubber, the scrubber throat part, the scrubber mist eliminator, and the pH level control. The flue gas is desulfurized in the scrubber, the temperature is raised to 80 C, and it is emitted from the stack. Carbide residue absorbs sulfur dioxide and becomes calcium sulfate. This slurry is transported to an ash pond about 1.4 km away, and the supernatent liquid is circulated and is reused. The desulfurization rate and dust elimination rate are both more than 90%.

26452 **APTIC NO. 48437**

Terlyanskaya, A. T. and L. P. Finogeyev

CATALYTIC PURIFICATION OF WASTE GASES FROM LACQUER AND PAINT PRODUCTION. (Kataliticheskaya ochistka otkhodyashchikh gazov proizvodstva lakokrasochnykh materialov). Text in Russian. Khim. Prom. (Moscow), 47(8):583-584, 1971. 2 refs.

A pilot-scale process for the catalytic purification of lacquer and paint manufacturing-generated waste gases containing acrolein, phthalic anhydride, and xylene is described. The throughput capacity was about 50 cu m/hr. The catalyst used is composed of 47-51% of copper oxide, 40-46% of chromium trioxide, and at least 2% of calcium oxide; the catalyst charge in the reactor is 1.5-3 l. The optimum conditions for the catalytic purification were determined to be a bulk speed of 30,000 40,000/hr, a temperature of 370-390 C, and a combined organic contaminant concentration not higher than 3 mg/l (expressed in xylene). The efficiency was 76.4-96.4%. The waste gas to be treated was heated up by heat exchanger in utilizing the excess heat of the treated gas which is cooled to 100-115 C before discharge.

26453 **APTIC NO. 47996**

Uchiyama, Yoshitada, Sadaichi Ozaki, Kin-ichi Motohashi, and Junkichiro Dai

CONTROL OF NOX IN DIESEL ENGINE EMISSION BY EGR. (Dizeru kikan no NOx taisaku to shite no haiki gasu saijunkan). Text in Japanese. Kikai Gijutsu Kenkyusho Shoho (J. Mech. Eng. Lab.), 26(6):264-278, Nov. 1971. 17 refs.

Exhaust gas recirculation with water injection into the intake manifold was used to reduce nitrogen oxides emissions from diesel engines. The test was performed using a commercial precombustion-type of diesel (total displacement, 4.5 l and maximum output, 75 ps/2400 rpm). This type of engine generally has lower emissions than most other types. The NOx concentrations were determined by non-dispersive infrared and ultraviolet analysis. Carbon monoxide, smoke density, and engine performance were measured with conventional methods. The recirculation of 30% of the intake air was effective in reducing NOx at a range of 0/4 to 3/4 of full load. An application of this method at full load was not useful because of increasing smoke density. The water injection method was more effective at full load than recirculation, because water injection worked without increased smoke density. The maximum quantity of water injection was 60% of the fuel flow.

26454 **APTIC NO. 48332**

Venrooy, John Joseph van

REDUCING SULFUR CONTENT AND REMOVING METALLIC IMPURITIES FROM PETROLEUM RESIDUES. (Verfahren zum Vermindern des Schwefelgehalts und zum Entfernen von metallischen Verunreinigungen eines Erdoel-Rueckstandoels). Text in German. (Sun Oil Co., Philadelphia, Pa.) W. Ger. Pat. Appl. 2,142,818. 25p., Aug. 26, 1971. (7 claims).

A petroleum residue treatment procedure is described designed to eliminate the residues of nickel, vanadium, and sulfur which would otherwise poison the catalyst used in subsequent hydrotreating and hydrocracking. The residue is treated simultaneously or in sequence with a hydrogen-donor fluid and activated clay or bauxite as a scrubbing compound at 355-399 C below coke-forming temperatures and at pressures between 79.3 and 210.9 atm. The weight ratio of the H-donor to the petroleum residue should be 0.5-2.5:1. Following treatment the metal-free residual oil is separated from the porous inorganic adsorbent which is regenerated by thermal treatment with air and returned to the process. It is advantageous to add a small amount of vanadinacetylacetonate to the H-donor during the beginning stage of the treatment to give faster stabilization of process conditions and to minimize coke formation. The scrubbing compound used amounts to form 3 to 15% by weight of the charge. In the reactor, hydrogen exchange takes place between the oil residue and the H-donor with the formation of low-boiling hydrocarbon fractions; thermal cracking also takes place. The scrubbing compound adsorbs H from the gaseous phase and which becomes enriched with metals from the residue as well as with coke forming during the process.

26455 **APTIC NO. 48329**

Vestal, Marvin L., Alan G. Day, III, J. S. Snyderman, Gordon J. Fergusson, F. W. Lampe, R. H. Essenhigh, J. F. Hudson, G. E. Lerner, D. W. Kennedy, R. Chase, A. L. Yergey, and Wm. H. Johnston

SULFUR BEHAVIOR AND SEQUESTERING OF SULFUR COMPOUNDS DURING COAL CARBONIZATION, GASIFICATION, AND COMBUSTION. (FINAL REPORT). Scientific Research Instruments Corp., Baltimore, Md., Office of Air Programs Contract CPA 70-50 EPA-R2-72-041, Rept. SRIC 71-15, 133p., May 1971. 5 refs.

NTIS: PB 211481

Studies on coal desulfurization and related investigations were conducted including application of non-isothermal kinetic studies to the theoretical, experimental, and practical problems associated with the removal of sulfur from coal. A computerized non isothermal kinetic laboratory was designed, built, and put into operation to increase the efficiency and precision of data acquisition and interpretation. Detailed non-isothermal kinetic studies of the desulfurization and gasification of five bituminous coals, lignite, anthracite, and pyrite, under reducing and oxidizing atmospheres, were conducted. An attempt was made to identify the types of sulfur bonding associated with the removal of sulfur from what are called Organic I, Organic II, and Organic III sites, by application of the method to the impregnation of coal chars with a number of sulfur-containing model compounds and to their subsequent desulfurization. Non-isothermal kinetic measurements of the removal by adsorption and absorption of hydrogen sulfide and sulfur dioxide produced in the desulfurization under both reducing and oxidizing conditions by calcium oxide and dolomite were carried out. In addition, reactions of hydrogen sulfide with iron, iron sulfide, and various coal chars were investigated in order to facilitate a quantitative understanding of the back reactions of coal desulfurization that reduce the overall efficiency of the desulfurization process. Application of the kinetic parameters obtained to the desulfurization performance of a simple experimental reactor was made. (Author introduction modified)

MEASUREMENT METHODS

1972

26456 **APTIC NO. 48454**

VDI (Verein Deutscher Ingenieure), Duesseldorf (West Germany), Kommission Reinhaltung der Luft

MEASUREMENT OF DUST FALL. A SURVEY. (Messung partikelfoermiger Niederschlaege. Uebersicht). Text in German. VDI (Ver. Deut. Ingr.) Richtlinien, 2119(1):1-4, June 1972. 4 refs.

Principles of the measurement of solid and liquid particulate fallout are outlined. Collecting vessels with or without funnel and with horizontal opening, and horizontal collection plates, also suitable for morphological investigations, are described. The sampler should be exposed at a height of 1.50-2 m above the ground, and its distance from obstacles should be at least 10 times the elevation of the latter. Gravimetric determinations are adopted to both types of samplers. The type of the sampler and method of determination should be always specified for dust measurement data. Dust fall measurement by means of a Bergerhoff sampler has been adopted as a standard method for comparison with samplers and measurement methods.

26457 **APTIC NO. 47842**

Allen, R. J. and W. E. Evans

LASER RADAR (LIDAR) FOR MAPPING AEROSOL STRUCTURE. Rev. Sci. Instr., 43(10):1422-1432, Oct. 1972. 9 refs.

A third-generation experimental Q-switched ruby lidar useful for air pollution mapping and meteorological studies is described. The system incorporates automatic inverse-range-squared receiver gain compensation, coaxial transmitter and receiver optics, automatic scanning and pulsing at equal angle increments or time intervals for fixed operation and at equal distances traveled for mobile operation, and video disk storage and instant replay of scan sequences. Design criteria, operating variables and procedures, and applications of the technique are defined. (Author abstract modified)

26458 **APTIC NO. 48146**

Andel Alois, Zdenek Jirak, Vladimir Zemlak, and Josef Hostalek

INDIVIDUAL DETERMINATION OF THE AMOUNT OF DUST IN INSPIRED AIR. (Individualni stanoveni mnozstvi prachu ve vdechovanem vzduchu). Text in Czech. Pracovni Lekar. (Prague), 24(6):206-209, Sept. 1972. 20 refs.

A device developed for the gravimetric measurement of the amount of individually inspired dust consists of a half-mask, two inspiration valves with a screwed-on casing containing accurately weighable filters of organic microfibers, and an expiratory valve. If a Wright respirometer type 371627 is fitted to the connecting neck behind the expiratory valve of the half-masks, then ventilation can also be measured. A small adjustment permits the collection of a sample of expired air. The device was calibrated in a dust chamber and results were compared with values obtained gravimetrically on standard flat 35 mm filters. A close correlation was found to exist between values measured by the two methods. The mask causes no subjective breathing difficulties even after one hour of work at full work load. The device was developed for the determination of dust exposure in occupations where standard methods would not yield true values for example where the workers move around a lot and for comparison with values obtained by standard measuring apparatuses.

26459 **APTIC NO. 48003**

Askne, C. and C. Brosset

DETERMINATION OF STRONG ACID IN PRECIPITATION, LAKE-WATER AND AIR-BORNE MATTER. Atmos. Environ., 6(9):695-696, Sept. 1972. 1 ref.

The reduction of pH in lakes and in the ground is commonly ascribed to emissions of sulfuric acid, primarly caused by sulfur dioxide emissions. Consequently, reduced pH in rainwater can be assumed to be a result of additions of strong acid. Therefore, it is important to be able to determine the concentration of strong acid in precipitation, lakes, and air-borne matter. A method is described for determining strong acid in rainwater by eliminating carbon dioxide in the sample, followed by titration with sodium hydroxide using Gran s plot.

26460 **APTIC NO. 48176**

Avdukova, N. V., T. P. Antsiferova, and L. D. Loyko

AN EXPRESS PHOTOMETRIC METHOD OF DETERMINING FORMALDEHYDE IN THE AIR POLLUTED WITH EXHAUST GASES. (Bystryy fotometricheskiy metod opredeleniya formal degida v vozdukhe, zagryaznennom vykholopnymi gazami). Text in Russian. Gigiena i Sanit., no. 9:69-71, Sept. 1972. 4 refs.

An express colorimetric method of great sensitivity and reproducibility for the determination of exhaust gas formaldehyde in, for example, open pits is described. Chromotropic acid in sulfuric acid is used as the reagent. Optimal optic density is reached in minutes without heating the solution by the use of 60-70% H2SO4 by volume. Sampling is done by means of evacuated collector. The formaldehyde concentration is determined by means of a calibration curve set up for 0.01 mg of formaldehyde per ml. The standard deviation is at 9.5%.

26461 **APTIC NO. 47988**

Blum, Wolfgang, Siegfried Mueller, and Wolfgang Hrosch

COMBINATION OF A GAS CHROMATOGRAPH WITH MASS SPECTROMETER - PROBLEMS AND APPLICATIONS OF THE METHOD. (Die Kombination eines Gaschromatographen mit einem Massenspektrometer - Problematik und Anwendung der Methode). Text in German. CZ-Chem.-Tech., 1(8):385-392, Aug. 1972. 46 refs.

The combination of a gas chromatograph with a mass spectrometer, and some applications of some combinations in the analysis of organic substances are described. Gas chromatographs suitable for combination with a mass spectrometer are composed of a thermostat accommodating the separator column, carrier gas (helium or hydrogen), and temperature control units. Gas chromatographs with carrier gas flow rates of 1-8 ml/min require reducing capillary, and those with flow rates above 8 ml/min helium require a separator for connection with the mass spectrometer. Magnetic sector field, quadrupole, and flight-time mass spectrometers should have high recording speed, high sensivity, sufficient pumping capacity, linear reading, and possibilities for the visual evaluation of the mass spectra of individual gas-chromatographic fractions, as well as for the integration with data processing systems. The conventional electron bombardment ionization in the mass spectrometer is increasingly replaced by the chemical ionization reaction gas such as methane or isobutane, which may be identical with the carrier gas, previously ionized by electron bombardment for the ionization of the gas to be analyzed through proton or hydride ion transfer. The high pressure (about 1 torr) applied eliminates the need for pressure reduction between the gas chromatograph and mass spectrometer. A Finnigan Datasystem model 150 is suitable for the automatic control of the mass spectrometer whose raw output data are stored for subsequent processing; numeric or graphic readout of real-time gas chromatograms; reconstructed gas chromatograms; fragment spectrograms; normalized spectra; the subtraction of the spectral background; the readout of averaged spectra; and spectral comparison. A packed separator column with jet separator and quadrupole mass spectrometer were used for the analysis of hashish extract; the thin-layer capillary without helium separator and with quadrupole mass spectrogram were applied to lithium cyclopropyl-halogenated aromatics mixtures. Low-boiling hydrocarbons in spark ignition engine exhaust were analyzed by means of thin-layer separator capillary of 50 m with directly connected mass spectrometer. A short, apolar thin-layer separator capillary was used for polychlorinated biphenyls. Chemical ionization is best for the analysis of barbiturates and amphetamines.

26462 **APTIC NO. 48182**

Brosset, C. and A. Akerstrom

LONG DISTANCE TRANSPORT OF AIR POLLUTANTS -- MEASUREMENTS OF BLACK AIR-BORNE PARTICULATE MATTER (SOOT) AND PARTICLE-BORNE SULPHUR IN SWEDEN DURING THE PERIOD OF SEPTEMBER-DECEMBER 1969. Atmos. Environ., 6(9):661-673, Sept. 1972. 7 refs.

Daily mean values of black airborne particulate matter (soot) and particle-borne sulfur in Sweden were obtained to clarify their long distance transport. Soot was sampled by a sampling probe, collected on a Whatman filter and measured by transmittance. Sulfur was sampled in a similar fashion, except that a Millipore filter was used and the filters were directly analyzed by X-ray fluorescence spectrometry. Samples were taken in areas with minimums and maximums of local contribution. Sulfur was also determined in soot collected on Whatman filters. The methods are detailed and evaluated.

26463 **APTIC NO. 48082**

Bruner, Fabrizio, Arnaldo Liberti, Massimiliano Possanzini, and Ivo Allegrini

IMPROVED GAS CHROMATOGRAPHIC METHOD FOR THE DETERMINATION OF SULFUR COMPOUNDS AT THE PPB LEVEL IN AIR. Anal. Chem., 44(12):2070-2074, Oct. 1972. 7 refs.

A gas chromatographic apparatus for monitoring sulfur compounds in the air (sulfur dioxide, hydrogen sulfide, methyl mercaptan, and dimethyl sulfide) is described. The column is made of Teflon tubing 3 mm in diameter and 1.25 m long packed withic graphitized carbon black treated with 0.5% phosphoric acid and 0.3% Dexsil. An exponential dilution flask constructed of Teflon is used to obtain calibration curves.

(area vs. concentration), and its feasibility is demonstrated. The gas chromatographic procedure is compared with integral methods using bromine coulometry and colorimetry. (Author abstract)

26464 **APTIC NO. 48270**

Chapman, Robert L.

INSTRUMENTATION FOK STACK MONITORING. Pollut. Eng., 4(6):38-39, Sept. 1972.

Standards of performance for new stationary sources published by the Environmental Protection Agency cover fossil-fuel-fired steam generating units for more than 250 million/Btu/hr/input, nitric acid plants, sulfuric acid plants, incinerators of more than 50 t/day charging rate, and portland cement plants. Emission tests are required for all these sources; the first three categories are also required to have continuous emission monitoring instruments for visible solids and/or sulfur dioxide and oxides of nitrogen. Source monitoring may be accomplished by extractive, in-situ, or remote methods. In-situ instruments operate on the optical principle and can monitor SO2, NOx, or smoke. Extractive techniques include optical for SO2 and NOx, wet chemical for SO2 and NOx, electrochemical for SO2 and NOx, chemiluminescent for NOx, and flame photometric for SO2. No guidance is provided in the standards for selection of monitoring equipment. Costs are given for the basic equipment.

26465 **APTIC NO. 48256**

Clemente, Gian Felice

DETERMINATION OF TRACE ELEMENTS IN ATMOSPHERIC AEROSOLS BY MEANS OF NEUTRON ACTIVATION ANALYSIS. (La determinazione degli elementi in traccia in aerosol atmosferici mediante attivazione neutronica). Text in Italian. Chim. Ind. (Milan), 54(9):805-808, Sept. 1972. 9 refs. (Presented at the Giornate della Chimica, 23rd Convegno, Milan, Italy, April 19-20, 1972.)

Stable elements in atmospheric aerosols can be measured if a sample collected on a Whatman or Millipore filter in a quartz crucible is irradiated in a reactor by 1 MW and a flux of 2.6 times 10 to the 12th power ng/sec sq cm for 6-8 hr and if the activated radionuclides are subsequently measured by gamma spectrometry. The analysis by neutron activation without chemical separation is accomplished by a Ge-Li coaxial high resolution detector 3-4 days after the irradiated crucible has cooled without removing the filters from the crucible. At that time radionuclides of a half-life of the order of 1-2 days are measured. Twenty-five to 30 days later the sample is measured to detect radionuclides with a half-life exceeding 15 days. This analytical method cannot determine stable elements whose half-life is shorter than 5 hours. To that end the sample is irradiated for a much shorter period so that it can be handled immediately without excessive precautions after only 5-10 min of cooling.

26466 **APTIC NO. 48188**

Collier, Ledelle

DETERMINATION OF BIS-CHLOROMETHYL ETHER AT THE PPB LEVEL IN AIR SAMPLES BY HIGH-RESOLUTION MASS SPECTROSCOPY. Environ. Sci. Technol., 6(10):930-932, Oct. 1972. 5 refs.

A high-resolution mass spectral procedure with the capability of measuring bis-chloromethyl ether at the 0.1-ppb level in air containing other organic compounds was developed. The procedure utilizes an enriching adsorber of Porapak Q, a high-surface-area aromatic copolymer in bead form, to adsorb the organic compounds from a volume of air. The adsorbed compounds are then thermally eluted into the reservoir of the mass spectrometer. The intensity of the ions at m/e 78.9950 was measured with a resolution of 1/3500. The experimental procedure is described; standardization and calibration equipment are reviewed; and experimental results are analyzed.

26467 **APTIC NO. 48384**

Couper, C. H., D. Grantham, and E. M. Rathus

MEASUREMENT OF DUST AS A HEALTH HAZARD. Queensl. Gov. Mining J., 73(843):8-10, Jan. 1972. 2 refs.

A Diffraction Size Frequency Analyzer (DISA) was designed to measure respirable surface area of dust accurately, automatically, and rapidly. Respirable surface area is measured directly for that fraction of the dust that is deposited in the alveoli of the lungs. Under the influence of silica, phagocyte cells appear to release substances that promote the growth of fibrous tissue, leading to the development of the nodules characteristic of silicosis. This activity for mixed dusts might be associated with the surface area or mass rather then the number of particles. A short description of the theory and operating features of the DISA instrument is presented. The glass slides or cover slips containing the dust samples are first prepared by a shadowing technique, and a number of slides are placed in an instrument which is then evacuated. Aluminum is evaporated from a hot filament and, in the high vacuum, the molecules of aluminum travel in straight lines and condense on the cold surfaces of the glass slides. The dust particles shield the areas behind them, and after removal of the dust by washing, the areas shielded by the dust particles form transparent images of these particles as holes in the aluminum mirror, which are equal in area to the projected area of the dust particles. In the DISA instrument, parallel light diffracted through these holes is measured automatically; by using a suitable filter, the measurement can be restricted to those particle sizes that correspond to the respirable deposition curve. After installation of the DISA in Brisbane, dust samples were taken with modified thermal precipitators in the Brisbane area at quarries, monumental masons, road cuttings, and coal mines, and these were assessed.

26468 **APTIC NO. 48373**

Crable, George F.

STUDY OF AIR POLLUTANTS BY MICROWAVE SPECTROSCOPY. (FINAL REPORT). Dow Chemical Co., Midland, Mich., Analytical Labs., Environmental Protection Agency Contract CPA-22-69-144, EPA-R2-72-093, 73p., June 1972. 10 refs.

NTIS: PB 212554

The application of microwave spectroscopy to analysis of air contamination was assessed. Background information and theory, analytical procedures, and test results are examined. The compounds used within the study were sulfur dioxide, ammonia, formaldehyde, nitrogen dioxide, methyl mercaptan, carbonyl sulfide, and acetone. The optimum power saturation method, line areas, and line intensities were compared as three possible analytical procedures. Advantages and disadvantages of the three methods are examined. For air pollution work, a microwave spectrometer should be considered as a very specialized analytical tool to be used only when its unique identification ability can be utilized.

26469 **APTIC NO. 48459**

Ducarme, J.

DETERMINATION OF SPECIFIC DIESEL ENGINE-GENERATED POLLUTANTS IN A CLOSED SPACE IN VIEW OF THE DEVELOPMENT OF A VENTILATION SYSTEM. (Determination des polluants specifiques par moteurs Diesel dans un espace clos en vue de l etablissement d un systeme de ventilation). Text in French. Tribune CEBEDEAU (Centre Belge Etude Doc. Eaux), 25(348):461-464, Nov. 1972. 4 refs.

Procedures adopted for the dynamometer test stand and field measurement of carbon monoxide, nitrogen oxides, and smoke in autobus diesel engine exhausts are described. The exhaust CO content was determined by gas chromatography, and the modified Saltzman method was used for the measurement of nitric oxide and nitrogen dioxide. The cartridge smoke index, the engine speed, and the fuel dosaging were simultaneously recorded by a SFIM-type instrument. Field tests were performed under idling conditions at speeds of 20-40 and 60 km/hr, during acceleration from 0 to 20 and from 20 to 40 km/hr at a rate of 1 m/sq sec, and during deceleration from 40 to 20 and from 20 to zero km/hr at a rate of 1.5 m/sq sec.

26470 **APTIC NO. 48274**

Edmonds, Robert L.

COLLECTION EFFICIENCY OF ROTOROD SAMPLERS FOR SAMPLING FUNGUS SPORES IN THE ATMOSPHERE. Plant Disease Reptr., 56(8):704-708, Aug. 1972. 10 refs.

The collection efficiency, and thus the accuracy of the samplers for obtaining quantitative data, is important in sampling fungus spores in the atmosphere. A method for calculating the efficiency of a Rotorod impaction aerosol sampler is given. If the particle parameter is calculated to be greater than 10, then the efficiency of collection is close to 100%. If the particle parameter is less than 10, then the collection efficiency can be read from a curve of collection efficiency correlated to particle parameter. As an alternative, the size of the collecting surface can be modified to increase collection efficiency.

26471 **APTIC NO. 47854**

Eguchi, Tadashi and Koichi Yamashita

INSTRUMENTATION OF STACK EFFLUENT MONITOR FOR NITROGEN OXIDES. (Endo haigasu chu no chisso sankabutsu nodo sokutei sochi no kaihatsu). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 258. (Nov. 7-9, Paper 212.)

Various problems in the application of the chemiluminescence method of monitoring nitrogen oxides in flue gas were studied by field tests, and the problems in the sampling mechanism of flue gas were reported. Irradiation of sample gas and ozone on the light board in parallel was suitable for an extensive continuous monitoring of flue gas. Ozone was originally supplied by pure oxygen, but the maintenance of an oxygen pump was difficult. To solve this problem, oxygen from the atmosphere was utilized. The use of ozone from pure oxygen gives a good linear result and high sensitivity. But NOx concentration in flue gas ranges between 100 and 1000 ppm, and therefore, atmospheric oxygen can be used easily. In order to measure NOx accurately in a in a flue, it is necessary to pass the sample gas through a converter after supplying oxygen. The SO2 in flue gas had no effect on the measurements of NO or NOx. For the measurement of NO when the temperature of the sample gas was high, the quality of the probe and the soiling on the inner wall of the probe presented problems. For measuring NOx, in addition to the above problems, the loss of NO2 by the sampling tube, the dust filter, dehumidifier, and the selection of the material for parts were especially important.

26472 **APTIC NO. 47855**

Endo, Ryosaku, Mori Kamada, Toshiaki Nakajima, Tatsunori Oya, Hideaki Goto, and Tetsutaro Kogo

FUNDAMENTAL STUDIES ON THE MEASUREMENT OF AIR POLLUTANTS. (PART 3). INTERFERENCE OF NO2 AND NO ON OXIDANT MEASUREMENT BY KI METHOD. (Taiki osen busshitsu sokuteiho no kisoteki kenkyu. (Daisanpo) Okishidanto sokutei no bogai busshitsu toku ni chisso sankabutsu no eikyo ni tsuite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 266. (Nov. 7-9, Paper 220.)

Studies were made on the effects of a chromium oxide agent on the elimination rate of sulfur dioxide, the reduction rate of nitrogen dioxide, the oxidation rate of nitric oxide, and the effects of NO2 and NO on oxidant measurements. The SO2 was measured by the electroconductivity method, and NOx was measured by the Saltzman automatic meter. Oxidant was measured by an absorption spectrophotometer using neutral potassium iodide. By a Cr03-sulfuric acid paper of 400 sq cm, 95% of the SO2 was eliminated; less than 10% of the NO2 was eliminated, and more than 90% of NO2 passed through. When the paper was not used, the effect of NO2 on the measurement of oxidant was approximately 18%; when using the paper, the effect was 17%. When not using the paper, 25% of NO2 P-tube calculation was measured as oxidant, and when using the paper, 23% was oxidant. In general, 72% conversion calculation at 25 C was close to the actual concentration of oxidant. Approximately 18% of both NO2 and NO had influences on the measurements of oxidants.

26473 **APTIC NO. 48139**

Fedrick, Nicholas A., Alexis T. Bell, and Donald N. Hanson

PARTICLE COUNTING BY GLOW DISCHARGE PERTURBATION. Environ. Sci. Technol., 6(13):1117-1118, Dec. 1972. 1 ref.

The Coulter counter is restricted to measuring particulates in a liquid; therefore a gas-phase analog to the Coulter counter was developed using a constricted glow discharge as a means for counting and sizing airborne particulates. The device consists of a tube in which two electrodes, separated by a disc containing a small orifice, are mounted. Passage of a particle through the orifice causes a perturbation in the discharge current. The magnitude of these perturbations was determined proportional to particle diameter. (Author abstract modified)

26474 **APTIC NO. 48342**

Feldstein, M.

SPACE AGE INSTRUMENTATION -- WHERE ARE YOU? OR THE STATE OF THE ART IN AIR POLLUTION MONITORING. Preprint, American Inst. of Aeronautics and Astronautics, New York; Public Technology, Inc.; American Inst. of Chemical Engineers, New York; American Inst. of Mining, Metallurgical and Petroleum Engineers (AIME), New York; American Society of Mechanical Engineers, New York; Council of State Governments; Inst. of Electrical and Electronics Engineers, New York; International City Management Assoc.; National Assoc. of Counties; National Governors Conf.; National League of Cities; National Society of Professional Engineers; Society of Automotive Engineers, Inc., New York; and Conf. of Mayors, 6p., 1972. 13 refs. (Presented at the American Institute of Aeronautics and Astronautics, Urban Technology Conference and Technical Display, 2nd, San Francisco, Calif., July 24-26, 1972, Paper 72-624.)

The state of the art of instrumentation for air pollution monitoring and Federal and California state air quality standards are reviewed. The analytical procedures, efficiency, limitations, and sensitivity of the instruments are examined. The methods and applications include wet chemical methods and measurement by spectrophotometry or amperometry for oxidants; nondispersive infrared spectrophotometry for carbon monoxide; conductivity analyzers, coulometric methods, and colorimetry for sulfur dioxide; colorimetric analysis for nitrogen dioxide; flame ionization detectors for hydrocarbons; and high-volume samplers for suspended particulates. Newer technologies for air pollution monitoring are also mentioned.

26475 **APTIC NO. 48104**

Gnyp, A. W., S. J. W. Price, C. C. St. Pierre, and James Steiner

PROBLEMS OF STACK SAMPLING: PART IV--FILTERS, GAS METERING. Water Pollution Control (Toronto), 110(11):42-44, Nov. 1972.

The characteristics and limitations of the various components of a stack sampling train are discussed. These components include membrane filters, tar cameras, composite filters; cyclones; electrostatic and thermal precipitators; impinger and absorption collectors; freeze-out traps; gas meters; and gas movers. Membrane filters are generally used for collecting small particles such as colloids and bacteria; vinyl metricel membrane filters are recommended for submicron particle filtration; tar cameras are designed for the collection of nonaqueous mists. Soluble filters for special purposes have been prepared from sugar, salt, salicylic acid and acenaphthene; their use is restricted to temperatures below 50 C. Cyclones can collect 5-10 micron particles, but may interfere with location of the sampling nozzle. Wet impingers collect both gaseous pollutants and particulates; dry multistage impactors are generally used for determining particle size distribution in flue gas. Gas meters are usually integrating volume meters or rate meters. Instantaneous response is not obtained with either type, but experienced operators can more readily adjust rate meters to approach instantaneous readings.

26476 **APTIC NO. 48302**

Haeselhoff, H.

OPERATING EXPERIENCES WITH EMISSION MEASURING UNITS IN COAL-FIRED HEATING POWER PLANTS. (Betriebserfahrungen mit Emissionsmessgeraeten in kohlegefeuerten Heizkraftwerken). Text in German. Energie (Munich), 24(11):285-290, Nov. 1972. 6 refs.

With the expansion of the power plants in Duisburg in 1964 the installation of three photoelectric smoke density measuring units and three sulfur dioxide measuring units operating on the principle of infrared radiation absorption became necessary. Design and operating experiences with these units are described. The smoke density measuring units comprise an optical unit, a reflector, an electronic evaluator, and a recorder. Through a symmetric set of plane mirrors and condensers in the optical units two images of a lamp filament are produced on the level of the modulator. The measurement beam with a frequency of 1500 Hz, and the control beam with a frequency of 2400 Hz are bundled by two lenses. The measurement beam penetrates the flue gas duct and is reflected. Operating troubles were encountered with the blowers, the color filters, and the reflector. The SO2 measuring units operated satisfactorily. The average individual deviation between the recorded and the analytically determined SO2 concentrations was plus 0.001 + or 0.00 g SO2/cu m flue gas. The adjustment time (90%) of the measuring value, however, exceeded 200 sec which is the limit set by the inspection agency. For a reduction of this time, the connecting hose between sampling probe and measuring unit was narrowed from a diameter of 6 mm to one of 3 mm, and the distance between probe and measuring unit had to be shortened.

26477 **APTIC NO. 48315**

Hamamoto, H., S. Hattori, H. Kono, and A. Kanazawa

MICRO-MEASUREMENT OF ATMOSPHERIC FLUORINE BY ALKALI FILTER PAPERS. (Arukari roshiho ni yoru taikichu fusso no biryo sokuteiho). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):421, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

The litmus paper and alkali filter paper methods can be used to measure fluorine concentrations. However, these methods usually require a lot of time and material. Alkali filter papers and positive ion exchange resins were tested to enhance knowledge of convenient testing methods. Alkali concentrations of 10, 20, and 30% were set up, fluorine was added, and the infrared-120 absorption was measured before and after disposition. The reduction of absorption prior to disposition was due to pH and carbonate. The infrared-120 disposition figure was similar to that obtained by a medium heating disposition. The infrared-120 dispostion method is extremely simple and can be used for a number of pollutants. Interference from strong winds and humidity was avoided by putting alkali filter papers around a cylinder with a 10-centimeter circumference.

26478 **APTIC NO. 48399**

Hupe, K. P. and H. Schrenker

THE UNIVERSAL LIQUID CHROMATOGRAPH MODEL UFC 1000. (Universal- Fluessigkeits-Chromatograph UFC 1000). Chromatographia, vol. 5, 1972. 9 refs. Translated from German. 13p., 1972.

A new method for liquid column chromatography was developed to permit analytical and preparative separations using any phase system without limitation. The design, instrumentation, operating procedures, and application potential of the chromatograph are examined. The method was tested in the separation of antioxidants, aromatic hydrocarbons, and polyethylene glycols.

26479 **APTIC NO. 48159**

Hwang, Jae Young

TRACE METALS IN ATMOSPHERIC PARTICULATES AND ATOMIC ABSORPTION SPECTROSCOPY. Anal. Chem., 44(14):20A-24A, 26A-27A, Dec. 1972. 46 refs.

Methods of detecting mercury, lead, arsenic, and selenium in atmospheric particulates are reviewed. Analytical methods described included optical emission spectroscopy, X-ray fluorescence spectrometry, and atomic absorption spectrometry. The advantages and disadvantages of each method are compared. To circumvent the difficulties and problems encountered in atomic spectroscopy in analyzing atmospheric samples and to improve results, it was suggested that, depending on the levels of analytes, the sampling techniques should be varied, that some samples should be pretreated or preconcentrated, and that flameless methods should be used. Flameless techniques recommended included the tantalum ribbon atomizer, the heated graphite atomizer, the carbon rod atomizer, and the graphite furnace technique.

26480 **APTIC NO. 48166**

Ikebe, Yukimasa

DETERMINATION OF THE SIZE DISTRIBUTION OF POLYDISPERSE SUBMICRON AEROSOLS BY A RESPONSE MATRIX METHOD. Pure Appl. Geophys. (Basel), 98(6):197-212, June 1972. 21 refs.

An analytical method was developed for determining the size distribution of polydisperse submicron aerosols by analyzing Z(Q), the dependence of the aerosol concentration at the exit of a diffusion battery upon the flow rate, by an iterative technique using response matrices. The practical application and limitations of the technique were tested in numerical experiments and practical measurement. The method is applicable if Z(Q) can be determined within errors of about + or 5%. (Author summary modified)

26481 **APTIC NO. 47930**

Ishiguro, T., I. Koyama, K. Iwasaki, and Y. Fukushima

NEW ODOR MEASUREMENT METHOD AND APPLICATION OF THE ODOR BAG METHOD. (Akushu no atarashii hyojiho no donyu to 3-ten hikakushiki nioibukuroho no jisshirei). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 2(8):31-40, Oct. 1972.

A new odor indicator multiplies by 10 the logarithm of odor intensity. In order to eliminate the shortcomings of the ASTM method, odor bag and three-point comparison methods are adopted. An aluminun bag filled with air is filled with odor so that the required rate of dilution is obtained with gas-tight syringe (50 ml to 1 microliter). The hole is then pasted with vinyl tape. Two odorless aluminum bags are also filled with air, and they and the sample bag are numbered and handed to the members of the panel. The answers given by them, identifying the smelly bag, are collected and calculated, giving 1.00 to a correct answer, 0.00 to an incorrect answer, and 0.33 to I don t know. Applying the formula, and plotting the rate of dilution and the rate of correct answers, the rate of dilution at 0.58 accuracy can be sought, which is the threshold value. Studies were made on the appropriate number of panel members. If more than four monitors tested the same concentration over three times, fully reliable data can be obtained. At a waste treatment plant, odor was measured as 40 before washing about 20 after washing; at the feed processing plant, even after washing, odor was 33, due to the inadequate processing method itself. Despite the use of airwicks at a human manure relaying point, high odor was recorded.

26482 **APTIC NO. 47851**

Ishii, Takeshi

POLAROGRAPHIC ANALYSIS OF AIR POLLUTANTS (I) THE POTASSIUM IODIDE METHOD. (Poraroguraful ho o mochiiru taiki osen bunseki (daiippo) - arukari KI ho no kento ni tsuite). Text in Japanese. Japan Societ of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 123. (Nov. 7-9, Paper 78.)

A polarographic technique was applied to the Potassium Iodide Method of ozone measurement, and some basic studies were done. A Oscillo-polarograph PR-20 and an X-Y recorder F42 were connected and used. Usually, colorimetry using an alkaline KI solution for analysis of oxidant results in much fluctuation. Tests were given to see whether ozone reacts to oxygen analysis polarographically. The alkaline KI absorbent was tested by direct, alternate, and square wave polarographs. The direct and alternate polarographs had a poor sensitivity and insufficient separation of oxygen residues. The square wave polarograph gave a clean separation of oxygen residues, high sensitivity, and a symmetrical polarogram.

26483 **APTIC NO. 47897**

Itakura, Jun, Takotoshi Tajima, and Shigeru Ushijima

APPLICATION OF NEUTRON ACTIVATION ANALYSIS TO DETERMINE TRACE METALS IN SETTLING PARTICLES AND SUSPENDED PARTICULATES IN THE AIR. (Chuseishi hoshaka bunsekiho no koka baijin oyobi fuyu funjin-chu no biryo kinzoku siebun teiryo e no oyo) Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 90. (Nov. 7-9, Paper 45.)

Settling particles were sampled by a deposit gauge and 20 mg were sealed in a polyethylene bag. Suspended particulates were captured by a high volume sampler with a glass fiber filter for 24 hr; three pieces 20 mm square were cut off and sealed in a bag. These test material and standard metal elements in a bag were inserted in an atomic reactor vertical test bin and were radiated by thermal neutron flux 5 times 10 to the 11th power n/sq cm/sec for one min. After cooling for 10 min a Ge (Li) detector and a high performance analyzer were applied and gamma ray spectra were measured. Peaks were compared and the metal content was calculated from the calibration line. Manganese, vanadium, aluminum, sodium, and chlorine were detected. The traceable limits were 0.06 micrograms for Mn and 0.04 micrograms for V.

26484 **APTIC NO. 47820**

Kisler, S. Ya.

MONITORING OF CONCENTRATION OF DISPERSE PHASE OF AEROSOL FLOWS BY ELECTRIC CONTACT METHOD. (Kontrol kontsentratsii dispersnykh faz potokov aerozoley kontaktno-elektricheskim metodom). Text in Russian. Mekh. Avtomat. Proizvod., 26(9):27-28, 1972.

The principle of the concentration measurement of disperse phases of aerosol flows by means of the electric contact method, and instruments designed for such measurements, are described. Electric contact disperse phase concentration measuring instruments model PK-2, PK-2S, and PK-2P have a measuring range of 0.01-10 g/N cu m, a temperature range of 20-1500 C and an error of + or 10%. The particle size should be smaller than 0.5 mm, and the humidity content of the gas flow should be below the dew point value. The particles in the disperse phase are charged to nearly maximum value by an electrizer, and these charges flowing off through a collecting electrode are proportional to the particle concentration. Another model PK-3 is designed for a measuring range of 0.1-10 g/N cu m, a temperature range of 90-120 C and for a flow rate of 45-55 m/sec. This model is used for the monitoring of dust concentrations in gas ducts in which a steel wire as sensing element is inserted.

26485 **APTIC NO. 47844**

Kobayashi, Toshiki and Tadashi Ikezawa

MEASUREMENT OF NITROGEN OXIDES IN EXHAUST GASES AND NITRATE IN THE AIR. (Endo haigasu chu chisso sankabutsu oyobi taiki chu shosankon no sokuteiho no kento). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th 1972, p. 261. (Nov. 7-9, Paper 215.)

Lab experiments and flue tests were conducted to examine the nitrogen oxides collection rates using a caustic soda solution, and the effects of sulfur dioxide were studied. Three types of samplers, G3 and G4 bubblers and an impinger were used. There was no significant difference between the collection rates of the two bubblers. Their maximum collection rates were obtained at 100-300 cc/min. The collection rate of the impinger was about 1/3 of the bubblers, and the rate dropped with the increase of the speed. The ratio of nitrous ion/nitrous ion plus nitrate ion was approximately the same for all three types of samplers; in all cases, the figures grew smaller with the increase of the sampling collection speed. The ionization rate of nitrogen dioxide was approximately 0.448 when the concentration was 110 ppm, and 0.428 when concentration was 45 ppm. For a quick and simple calibration of nitrate on filter paper, ion electrodes were used and a good correlation with other methods was obtained.

26486 **APTIC NO. 47847**

Konno, Shinya and Toshiichi Okita

PURIFICATION OF PAN. (PAN no tanri). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 267. (Nov. 7-9, Paper 221.)

Peroxyacetyl nitrate (PAN) is an unstable material and its calibration is extremely difficult since there is no standard gas. Pure PAN was successfully separated and calibrated by a procedure based on gas chromatography. A nitrogen carrier was passed through a packed tube at 40 C, and 50 ml/min. PAN was dissolved in 2.64 min. Nitrate propyl was added. When the relative sustaining time of nitrate propyl was 1, that of PAN gas 1.34; the flow quantity and temperature conditions for a separation column were determined based on these indexes. The PAN was synthesized by an irradiation apparatus and gathered in a trap of the separation column; for the substance collected in the separation column, only the fraction of PAN was trapped again. This was gasified and taken into a glass sampling tube. Then 1 N caustic soda was brought into contact with this standard PAN and the separated NaNO2 was measured by the Saltzman method in order to determine the PAN concentration of the test gas.

26487 **APTIC NO. 47843**

Kuroda, Daisuke

RELATIONSHIP BETWEEN NO2 AND NO PLUS NO2 IN ALKALINE SOLUTION. (Arukari Kyushu eki chu de no chisso sankabutsu no tenkaritsu ni tsuite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 255. (Nov. 7-9, Paper 209.)

Using an alkaline absorbent for nitrogen dioxide, ionization of NO2, the effects of gas absorption conditions, the stability of absorption composition and NO2 ion, and the comparison of the mobile absorption method (by air passage) and the fixed absorption method were examined by lab tests. The NO2 passage absorption using 0.1 N sodium hydroxide yielded a slightly higher ionization rate than the theoretical index (0.5) published by the JIS. The static (fixed) absorption ionization rate was lower than the theoretical figure. When using 0.1 N NaOH solution absorbing NO2 and nitric oxide individually, the ionization rate for NO2 higher than that for NO. When using the fixed absorption method, high pH figures resulted in greater ionization rates for both NO2 and NO. Higher temperature of absorbent resulted in lower ionization rates. The reason for the low ionization rate when using the fixed method was examined.

26488 **APTIC NO. 48175**

Luke, Connell L., Thomas Y. Kometani, John E. Kessler, Thomas C. Loomis, John L. Bove, and Benjamin Nathanson

X-RAY SPECTROMETRIC ANALYSIS OF AIR POLLUTION DUST. Environ. Sci. Technol., 6(13):1105-1109, Dec. 1972. 7 refs.

Direct nondestructive analysis of airborne particulate matter for common metals using X-ray fluorescence spectrometry was examined. Commercially available instrumentation was used for the direct determination of lead, zinc, copper, nickel, iron, manganese, and cobalt in samples collected on filter paper. Calibration was achieved by precipitating known amounts of these elements and collecting them on a Millipore filter disc which serves as a reasonably permanent standard. (Author abstract modified)

26489 **APTIC NO. 48398**

Martin, M., J. Loheac, and G. Guiochon

GROUP ANALYSIS OF INDUSTRIAL MIXTURES OF POLYNUCLEAR AROMATIC HYDROCARBONS BY RAPID LIQUID-PHASE CHROMATOGRAPHY. (Analyse par famille de melanges industriels d hydrocarbures aromatiques polynucleaires a l aide de la chromatographie en phase liquide rapide). Chromatographia, vol. 5:33-41, 1972. 20 refs. Translated from French. 18p., 1972.

The analysis of industrial samples for polynuclear aromatic hydrocarbons by liquid-phase chromatography on alumina gel at ambient temperature is reviewed. Using n-pentane or n-heptane as the mobile phase, columns of 1 or 2 m length, and an ultraviolet photometer, the hydrocarbons are separated essentially by the nature of their aromatic characteristics, while the elution time is more or less independent of the possible presence of alkyl chains or of their length. Instrumentation, experimental procedures, apparatus design, and some laboratory results are reviewed.

26490 **APTIC NO. 47929**

Matsushita, H.

TESTING METHODS OF SENSE OF SMELL. (Kyukaku kanno shikenho (2)). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 2(8):11-19, Oct. 1972. 6 refs.

A standard method of testing odors in industrial water and industrial waste water, ASTM D1292-65 (reapproved 1970), is described, which uses a series of severally diluted sample industrial water. The odor of the diluted industrial water is then tested by a triangle method. The odor intensity index is expressed by the degree of dilution at which the odor could be perceived first, i.e., threshold odor. The testing chamber must be fed with air which went through an activated coal layer, and kept at constant temperature and humidity (50%). Lighting must be right, so that the panel members will not be influenced by the coloring of the sample water. The flask containing turbid water must be covered. Care must be taken in selecting the right kind of panel members so that the test will be carried out with a high precision rate. Preparation of samples and the odor test must be done by separate individuals. These personnel must be free of any tobacco, shaving cream, or cosmetics smells. The sample water is taken in bottles used for a BOD test and cooled to 40 C, when sample water exceeds 40 C. If not immediately tested after sampling, these bottles must be cooled in ice water or odorless air and kept in a cool dark place. High, medium, and low degrees of sweetness, pungency, smokiness and rottenness and their combination result in classification of smells, whether they are ester-like, or alcohol-like. Odor from domestic animal excrement can be measured by the ASTM method or by a method developed by Burnett.

26491 **APTIC NO. 48277**

McHugh, J. A. and J. F. Stevens

ELEMENTAL ANALYSIS OF SINGLE MICROMETER-SIZE AIRBORNE PARTICULATES BY ION MICROPROBE MASS SPECTROMETRY. Anal. Chem., 44(13): 2187-2192, Nov. 1972. 21 refs.

Single micron-sized airborne particulates were analyzed using ion microprobe mass spectrometric techniques. The ion microprobe is capable of rapid analysis and provides a high elemental detection efficiency for most elements, making it applicable for compositional analyisis of small particles. The techniques of preparing, mounting, and analyzing particles as small as 1.5 micron are described. A sample of airborne particulates was examined by light microscopy and a group of 10 particles in the 2-8 micron size range with the characteristic oil-soot morphology was selected for ion microprobe analysis. Results showed that the average oil-soot particle is characterized by high levels of oxygen, vanadium, carbon, sodium, cadmium, and phosphorus. (Author abstract modified)

26492 **APTIC NO. 48267**

Moss, G. C. and K. R. Godfrey

CORRELATION TECHNIQUES APPLIED TO GAS CHROMATOGRAPHY: A RE-APPRAISAL WITH AN APPLICATION TO ENVIRONMENTAL POLLUTION MEASUREMENT. Meas. Contr., 5(9):351-353, Sept. 1972. 7 refs.

Possibilities for using the correlation technique for trace analysis by gas chromatography are discussed. The use of correlation is not justified in a normal chromatograph situation except where an early qualitative indication of a composition change is required. It can prove useful when the chromatograph is operating in a noisy environment where the base-line is no longer steady, but this situation does not occur very often in practice. Experiments were carried out to demonstrate the feasibility of applying cross-correlation to trace analysis by gas chromatography. The correlation technique was found to offer considerable advantages over the conventional single-sample injection method when minute quantities of a component in the sample gas are sought. Since the use of trace analysis in the field of environmental pollution is expanding, increased amount of users could reduce the present high cost of correlation equipment in the future.

26493 **APTIC NO. 47952**

Muehlen, Th. zur

DETERMINATION OF THE SOLVENT VAPOR CONCENTRATION IN AIR. SAMPLING AND GAS CHROMATOGRAPHIC ANALYSIS. (Bestimmung von Loesungsmitteldampf-Konzentrationen in Luft. Probenahme und gaschromatographische Analyse). Text in German. Zentr. Arbeitsmed. Arbeitsschutz, 22(9):264-276, Sept. 1972. 24 refs.

Solvent vapors are frequent air pollutants. They develop during cleaning, degreasing, lacquering, coating, production of chemical and pharmaceutical products, and production and processing of synthetics. Solvent vapors do not only contaminate the air over the working places, but they also emit and annoy the neighborhood with emissions. The sampling gas collection probes were used mainly for determination of working place concentrations. Furthermore, adsorption on silica gel and adsorption in solvents were suitable methods. The latter two sampling methods can be combined with the method of collection of the gas sample in a tube which is sealed after 20 to 30 l air have been pumped through. The adsorption method has been successfully applied for determination of solvent vapor mixtures in the waste air emitted by a lacquer manufacturing plant. The method was tested for determination of methanol and acetone vapors in the waste air of a coating station. The measured emission concentrations agreed well with the calculated concentration of about 15 g/cu m which was obtained from the applied solvent quantity and the waste air quantity. The adsorption method was also successfully applied for the determination of emission concentrations. Through the use of two adsorption tubes connected in parallel, plus a higher air throughput the ethylene acetate, i-butanol, and toluene emissions between 0.1 and 0.5 ppm in the vicinity of a lacquer production plant could still be measured. The three sampling methods are described in detail as is the calibration of the gas chromatographic equipment for the analysis of the gas samples from the gas collection tube or the solutions from the absorption method.

26494 **APTIC NO. 47889**

Nagasaki, Mamoru, Ryoji Ando, Tatsuo Hitomi, and Kumejiro Iwamoto

MEASUREMENT OF SULFUR DIOXIDE USING A SIMPLE AIR SAMPLER. (Aryusangasu kan-i saishusochi ni yoru sokutei ni tsuite). Text in Japanese. Preprint, Ministry of Health and Welfare (Japan) and Japan Environmental Sanitation Center, Tokyo, p. 67-68, 1972. (Presented at the National Environmental Sanitation Meeting, 16th, Niigata, Japan, Oct. 19-20, 1972.)

The new measuring device for atmospheric sulfur dioxide analysis is a combination of a conventional automatic analyzer and the newly designed simple air sampler. This combination has been developed to enable one to perform a multi-spot measurement of the SO2 at the same time. With this measuring device, air is first pumped into the impinger by a suction pump for bubbling in the absorbent liquid for 14 hours. The absorbent is then injected into the measuring cell of an automatic analyzer (Tokyo Kogyo KK Model 168-5) for measurement of SO2 concentration. The measurement is performed continuously for 24 hours. The internal wall of the impinger is coated with silicon resin in order to avoid dissolution of alkali while the usual black rubber plug has been replaced with a silicon rubber plug to prevent dissolution of sulfur. The sampling tube is a 1-meter long teflon tube that gives a minimum adsorption of SO2. The data obtained by this combination device was compared with those given by the SO2 automatic analyzer, which revealed that the former tended to be higher than the latter. The comparison test was thus performed 30 times to obtain the correction factor, which was 0.48 in average. For actual application, the correction factor was 0.5. Using this factor, correlation between the two methods was 0.93.

26495 **APTIC NO. 47985**

Nakahara, Shojiro

AIR POLLUTION MONITORING BY LASER. (Reza ni yoru taiki osen sokutei). Text in Japanese. Gijutsu to Keizai (Technol. Econ.), 6(11):27-35, Nov. 1972. 8 refs.

Air pollution monitoring by laser makes possible instant and automatic measurement, while in chemical measurements, air samples must be obtained, taking 30 minutes to 1 hour. Remote measurement is possible including flue gas and inversion layer measurements. A wider area can be measured with remote monitoring. There are four kinds of laser measurements which can be applied for the detection of dust, aerosol, and gases. In Japan, several laser radar systems have been put to practical use. Infrared spectrometry-laser systems are being studied. Although more effort will be required before a laser system can be in universal use, instant measurements of remote areas or at low concentration, which were impossible before, are now becoming a possibility.

26496 **APTIC NO. 47901**

Nakazawa, Yuhei, H. Kurita, and T. Sato

ON THE MEASUREMENT OF THE VOLUME OF ADHERED PARTICULATES. (Ryushijo no fuchakuryo no sokutei ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):373, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

A shelter or exposure box was used in arriving at a method of measuring the volume of atmospheric particulates adhering to buildings, plant leaves, and fruits, defiling their surfaces and damaging agricultural crops, although the adhering volume can be surmised from the volume of dust fall. A trapping board, made of either synthetic resin or glass, 10-100 sq m, was set inside a shelter or exposure box. The weight of particulates adhered to the board was measured and expressed in terms of g/cu m/30 days. The error was plus or minus 10%, with 95% reliability. There was significant difference (5%) in the volume of adhered particulates between the shelter and exposure box, and about 70% the volume adhered in the shelter adhered to the board inside the exposure box. There was not much difference after an exposure of 1 month or when the exposure was prolonged to 2-6 months. The glass cylinder in the shelter was wrapped with filtering paper, which was vertical. At the bottom of the cylinder, there was a plastic board. The volume of adhered particulates on the vertical surface was 1/10 of that adhered to the horizontal surface.

26497 **APTIC NO. 48081**

Natusch, David F. S., Homer B. Klonis, Herman D. Axelrod, Ronald J. Teck, and James P. Lodge, Jr.

SENSITIVE METHOD FOR MEASUREMENT OF ATMOSPHERIC HYDROGEN SULFIDE. Anal. Chem., 44(12):2067-2070, Oct. 1972. 13 refs.

A method is described for measuring trace levels of atmospheric hydrogen sulfide as low as 5 parts per trillion. The H2S is extracted from air by reacting with a silver nitrate impregnated filter. The collected silver sulfide is then dissolved with a sodium cyanide solution and analyzed fluorimetrically using very dilute fluorescein mercuric acetate and a spectrofluorimeter equipped with a Xenon lamp source. Collection conditions, recovery, interferences, and analysis of H2S by this method are described. Suitable prefilters are recommended. Efficiency of collection was studied as a function of H2S concentration, humidity, and flow rate. The method is both simple and reliable; its use in field sampling indicates H2S levels of about 50 ppt in the essentially unpolluted air of Colorado. (Author abstract modified)

26498 **APTIC NO. 48141**

Neiser, Jan, Vaclav Masek, and Jaroslav Pospisil

A CONTRIBUTION TO THE CHOICE OF METHODS SUITABLE FOR DETERMINING PYRIDINE AND ITS HOMOLOGUES IN THE AIR. (Prispevek k vyberu metod vhodnych pro stanoveni pyridinu a jeho homologu v ovzdusi pracovist). Text in Czech. Chem. Prumysl (Prague), 22(8): 408-410, 1972. 31 refs.

Existing analytical methods for pyridine fall into six categories. Titration methods use titration in a non-aqueous medium by a volumetric solution of perchloric acid with color or potentiometric indication. Spectrophotometric methods utilize the formation and analytically indicative color reactions of pyridine bases with bromocyan, barbituric acid, and other reagents. Gas chromatography is used to separate mixtures of pyridine bases, a strongly polar solvent like glycerin with several hydroxyl groups will separate even homologues which differ only slightly by their boiling point. Alternating current polarography permits the determination of depolarizers which are absorbed on a dropping electrode and form a monomolecular film (pyridine) or a multilayer film (picolins, lutidins) which is manifested on a dE/dT curve by notches which are evaluated quantitavely. Infrared spectroscopy determines various pyridine bases from their analytically usable wavelengths. Ultraviolet spectroscopy can be used to determine small amounts of pyridine bases with an error of 2%. These methods were tested in the laboratory on model compounds and mixtures; comparative evaluation disclosed that from the point of view of accuracy and simplicity the spectrophotometric method at 578 nm was most advantageous for the overall determination of pyridine bases; gas chromatography was best suited for the selective determination of individual pyridine homologues.

26499 **APTIC NO. 48118**

Nicolet, M. -A., J. W. Mayer, and I. V. Mitchell

MICROANALYSIS OF MATERIALS BY BACKSCATTERING SPECTROMETRY. Science, 177(4052):841-849, Sept. 8, 1972. 34 refs.

Backscattering spectrometry can be used in soil, smog, mineral, and other material analyses. The backscattering system is able to distinguish the atomic masses of elements present in the target sample by the mechanism of elastic recoil. A finite thickness of the target broadens, toward lower energies, the signal produced by a given element; the variation of this signal toward decreasing energy reflects the distribution of the element with increasing depth and makes possible depth perception. Backscattering is also sensitive to crystalline structure. Backscattering is useful for monitoring fabrication processes involving thin-film technology such as the growth of oxide layers on metals and semiconductors, for studying the forming of electrical contacts at low temperatures on silicon devices, and for analyzing oxide layers on corroded metals and coatings to paper. Thick targets can also be analyzed, such as the pollutants trapped by a filter during air pollution monitoring. Sensitivity and limitations of the backscattering technique are mentioned.

26500 **APTIC NO. 47931**

Nishida, K., T. Honda, and T. Ando

ON ODOR DEGREE MEASUREMENT EQUIPMENT. (I). (Shukido sokutei sochi ni tsuite. (I)). Text in Japanese. Akushu no kenkyu (Odor Research J. Japan), 2(8):24-30, Oct. 1972. 27 refs.

Based upon anti-odor law, enforcement regulation, regulations of the Prime Minister s Office, Public Notice No. 9 of the Environment Agency, were made public in May 1972, however, the basic problem of preventing odor remains still unrealistic and vague. Measurements and control standards for five specific odors (ammonia, methyl mercapton, hydrogen sulfide, methyl sulfide, and trimethyl amine) were adopted, but these are by no means sufficient There is no guarantee that so long as the intensity of these five elements are below the control standard there is no damage from odor. Handling of a chromatograph is complicated and requires skill. However, other methods such as the distilled water dilution method, salt water equilibrium method, pressurized air dilution method, by step dilution method using injector or odor bags, or use of a solvent in measuring the threshold value also present problems such as: the olfactory sense is greatly influenced by the atmospheric conditions at the time of measurement; olfactory senses differ according to the mental and physiological conditions of monitoring persons, fatigue can affect the olfactory sense: the by-step dilution method is apt to cause errors; no clear definitions for thresholds exist; preconceived ideas make the reproduction of results difficult; and repeated judgment is difficult. The odor index table method, enabling comparison of ppm values, although still incomplete, is a more rational method of evaluation.

26501 **APTIC NO. 47932**

Nishii, Shunji and T. Nakano

REVIEW OF A CO CONCENTRATION MEASUREMENT METHOD IN EXHALED AIR. (Koki chu CO nodo sokuteiho ni kansuru ichikosatsu). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):377, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

Soda lime can be used as a pretreatment agent for measuring carbon monoxide without interference from carbon dioxide in a non-dispersion infrared gas chromatograph. The exhalations of smokers and non-smokers were trapped in a Douglas bag, and carbon dioxide, whose concentraton was adjusted to be approximately the same as in exhalation (about 5%), was used. As a pretreatment before the sample was introduced into chromatograph, a calcium tube filled with 50 g of soda lime was connected with a tube filled with 200 ml barita water to which phenolphthalein was added. Carbon dioxide was checked on the trapped sample, which went through the chromatograph, by a Kitagawa detector. When only a soda lime tube was used, barita water lost its color 10 minutes after the sample was introduced and 0.1% CO2 was detected, when CO reached a minimum. With two soda lime tubes, over 80 minutes were required before barita water lost its color, and so long as CO was stabilized at minimum, no CO2 was detected. At more than 20 times the dilution rate, CO concentration went up less than 1 ppm, when CO concentration was the minimum and when the water lost its color. After connecting two soda lime tubes with barita water tube, after adding phenolphthalein, it is possible to measure with less than 1 ppm error the CO concentration is exhalation before barita water loses its color. Elimination of CO2 was insufficient when only one soda lime tube was used, and no reliable measurement could be made.

26502 **APTIC NO. 47869**

Nomine, M.

CRITICAL REVIEW OF SOME METHODS FOR THE DETERMINATION OF NO2 IN THE POLLUTED AIR. APPLICATION TO AIR MONITORING IN UNDERGROUND SITES. (Examen critique de quelques methodes de dosage de NO2 dans les atmoepheres polluees. Application aux controles d atmospheres dans les chantiers souterrains). Text in French. Pollut. Atmos. (Paris), 14(55):231-235, July-Sept. 1972. 9 refs.

A critical review of three different methods for the determination of nitrogen dioxide concentrations in underground sites is given. The Saltzman method using acetic and sulfanilic acids, the acetone, and the N-naphthylethylenediamine dichlorohydrate for a direct colorimetric determination requiring evaluation of the optic density within a few hours. This disadvantage is eliminated by another method which uses 0.1N sodium hydroxide and isobutylene, but which is of relatively low precision and reproducibility. Comparisons of the direct Saltzman method with Christie s method using sodium hydroxide and sodium arsenate for color development by means of Saltzman s solution following neutralization by hydrochloric acid showed good agreement with a mean deviation of about 1.5%.

26503 **APTIC NO. 48297**

Okuno, T., M. Tsuji, and N. Takata

ON THE ANALYTICAL METHOD FOR ODOR SUBSTANCES. (Akushu busshitsu no bunseki-ho ni tsuite). Text in Japanese. Hyogo-ken Kogai Kenkyusho Kenkyo Hokoku (Rept. Public Nuisance Res. Inst. Hyogo Prefect.), no. 3:8-13, 1972. 5 refs.

The separation and identification of odors by gas chromatography and mass spectrometry were tested. The main components of gases produced by heating a nitrogen compound fertilizer were determined as alkyl aldehydes and ketones by

the combined techniques. The organic electron theory for the identification of these compounds is discussed. The quantitative analysis of alkyl amines was also tested with respect to the proportional relationship between mole sensitivity and the carbon number of amines.

26504 **APTIC NO. 48127**

Oura, Masahiro

PRESENT STATE OF AUTOMOTIVE EMISSION GAS ANALYZERS. (Jidosha haishutsu gasu bunsekikei no genjo). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 11(131):169-180, Nov. 1972. 20 refs.

Inaccuracy in the analysis of the specific pollutants in automotive exhaust gas is attributable to possible errors of samplers and analyzers. Various factors affecting the available sampling methods are described. In the direct sampling method, for example, the flow channel of the sampled gas comprises a low-temperature trap in which some substances of low boiling point are likely to condense. Such condensation during sampling can distort values of hydrocarbons, nitrogen oxides, and ammonia. Similar problems involving total bag sampling include: possible changes in composition of the sample gas collected in the bag before the actual analysis; loss of hydrocarbons, aldehydes, and NOx due to the use of a cooling trap; the back pressure of the exhaust port affected by the quantity of gas in the bag during sampling. Proportional sampling and constant volume sampling are also discussed. The non-dispersive infrared analysis contact combustion, fluorescent non-dispersive infrared analysis, ultraviolet emission analysis, and reduction-hydrogen flame ionization analysis methods were introduced as applicable to analysis of carbon monoxide. Flame ionization and non-dispersive infrared analysis can be used for HC. Non-dispersive infrared and ultraviolet methods can be used for NOx. Chemiluminescent analysis was developed for more accurate measurement of NOx.

26505 **APTIC NO. 48372**

Peterson, Carl M. and M. Tomaides

IN-STACK TRANSMISSOMETER TECHNIQUES FOR MEASURING OPACITIES OF PARTICULATE EMISSIONS FROM STATIONARY SOURCES. Environmental Research Corp., St. Paul, Minn., Environmental Protection Agency Contract 68-02-0309, EPA-R2-72-099, 95p., April 1972. 3 refs.

NTIS: PB 212741

Basic research data were collected as a base for developing design and performance specifications for transmissometers which are to be used to measure smoke stack plume opacities. The influence of transmissometer illumination and light receiving angles and transmitted light wavelength on in-stack opacity measurements and their correlation with the stack plume opacity was tested on the stack of a pulverized coal-fired power plant. Complete data on instrumentation and testing procedures and results are presented. Measured in-stack transmittance was significantly dependent on illumination and receiver angles. Measured transmittance increased with increasing illumination and viewing angle, with 5 and 46% errors for 5 and 60 degree angles, respectively, when compared to true transmittance. Measured transmittance as a function of illumination light wavelength was also established. Using a small fixed illumination-viewing angle design transmissometer, a good correlation was determined between plume opacity and in-stack transmittance. (Author abstract modified)

26506 **APTIC NO. 47829**

Rhodes, John R., Andrzej H. Pradzynski, Colin B. Hunter, Jimmie S. Payne, and James L. Lindgren

ENERGY DISPERSIVE X-RAY FLUORESCENCE ANALYSIS OF AIR PARTICULATES IN TEXAS. Environ. Sci. Technol., 6(10):922-927, Oct. 1972. 14 refs.

Suspended particulate matter samples were collected in Texas using high-volume air samplers and were analyzed by energy dispersive X-ray fluorescence spectrometry. Standards made up from calibrated solutions deposited on filter paper and dried were measured along with the specimens and blanks. Analytical results were compared with those obtained by atomic absorption spectrophotometry. Air particulate pollution data from a statewide survey in Texas were compared with other available data. The pollutants determined included cadmium, titanium, vanadium, chromium, manganese, iron, cobalt, nickel, copper, zinc, mercury, lead, arsenic, bromine, strontium, zirconium, and molybdenum. The method and equipment were proved capable for use in air quality measurements and pollution source location. (Author abstract modified)

26507 **APTIC NO. 48351**

Rouillard, E. A.

DETERMINATION OF THE PARTICLE CONTENT OF FLOWING GASES. AN ANNOTATED BIBLIOGRAPHY. Council for Scientific and Industrial Research, Pretoria (South Africa), Chemical Engineering Group, Survey O/CHEM 5, Rept. 66/51/4510/2, 119p., May 1972. 480 refs.

An annotated bibliography on the sampling and monitoring of particulates in flowing gas streams is presented. It contains 480 references on topics including the determination of dust in industrial gases; stack sampling; ac and electrostatic precipitators; smoke density indicators; isokinetic sampling; nephelometry; filtration; baffles; gravimetric determination; Ringelmann charts; optical methods; photoelectric methods; cascade impactors; impingers; dust parameters; measurement method operating variables; cyclone probes; soot and ash measurements; continuous and automatic smoke measurements; calibration techniques; aspirators; photometers; and optical recorders.

26508 **APTIC NO. 48240**

Rueb, Friedmund

MONITORING AND MEASURING UNITS FOR DUST AND SMOKE. (Pruef- und Nachweisgeraete fuer Staub und Rauch). Text in German. Wasser Luft Betrieb, 16(11):375-381, 1972.

Dust samplers, particle counters, and dust measuring units using beta rays and lasers and smoke density meters are described and illustrated. One dust sampler has been developed for the use in all cases where the enrichment of dust and microorganisms is required. Large quantities of air between 300 and 1800 l/hr can be drawn on so that short measuring times are obtained. The dust concentration can be determined either by gravimetry or microscopically by particle counting. For the determination of the dust concentration in cleaned gases (ranging between 10 to 1000 mg/cu m) a dust measuring unit with venturi nozzle is available. The unit measures the dust concentration also in hot (up to 500 C) and wet gases. It is designed for gas quantity of 4 cu m/hr. A particle counter developed in the U. S. can be pieced together by individual modules. The basic unit comprises a sensor, a power supply unit, amplifier, indicator, and recorder. A portable particle counter is designed for an air throughput of 280 cu m/min. With it measurements from 0 to 10 million particles per 28,000 c cm can be counted. For the continuous measurement of dust concentrations between 0.005 to 11 mg/cu m air, a dust monitor is suitable which operates with beta rays. For smoke density measurements a unit comprising a light transmitter and receiver, the elctronic evaluator and a reflector, is available. Smoke meters mostly measure the light transmission, or light extinction. The newest development in the field of air monitoring is the use of laser beams. A pilot unit was installed in Munich.

26509 **APTIC NO. 48369**

Rusanov, A. A.

DETERMINATION OF THE BASIC PROPERTIES OF DUSTS AND GASES. In: American Institute of Crop Ecology Survey of USSR Air Pollution Literature. Some Basic Properties of Ash and Industrial Dust in Relation to the Problem of Purification of Stack Gases. M. Y. Nuttonson (ed.), Vol. 16, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 46-80. 111 refs. Translated from Russian. (Also: In: Ochistka dymovykh gazov v promyshlennoy energetike. A. A. Rusanov, I. I. Urbakh, and A. P. Anastasiadi (eds.), Moscow, Energiya, 1969, p. 405-440.)

NTIS: PB 211466

Sieve analysis, air separation, liquid sedimentation, microscopic analysis, cyclones, and multistage jet settlers (cascade impactors) are described for the determination of the size of ash or dust particles. Efficiency of dust-collecting devices depends on the particle size characteristic of the ash or dust after a certain coagulation of the particles in the gas conduits. The degree of particle coagulation in the gas conduits depends considerably on initial particle size. Measurement of the electrical resistivity of dust under industrial conditions is also described. The moisture content of gases can be determined by a psychrometer, the condensation method, and from observation of dew formation on a cooled surface.

26510 **APTIC NO. 48145**

Schuy, Klaus D. and Bodo Reinhold

MASS SPECTROMETRIC PROCESS GAS ANALYSIS IN THE IRON AND STEEL INDUSTRY. (Massenspektrometrische Prozessgasanalyse in der Eisen- und Stahlindustrie). Text in German. Stahl Eisen (Duesseldorf), 92(25):1278-1283, Dec. 7, 1972. 3 refs.

The application of mass spectrometry for process gas as well as waste gas analyses in the iron and steel industry has the following advantages: the analyses of all gas components such as carbon dioxide, carbon monoxide, nitrogen, oxygen, hydrogen, and water vapor can be carried out with one unit; the speed of the analyses is extraordinarily high and lasts equally long for all components, and the mass spectrometer signal produced by the gas component is directly proportional to the concentration of this component in the gas flow. Low quantities are needed for gas samples and calibration gas. The mass spectrometer can also be used for measuring pollutants in the calibration gas and for monitoring the calibration gas composition. The fundamentals of mass spectrometry are briefly reviewed and the design of a mass spectrometer is described. In the blast furnace, the oxygen lancing furnace, the electric arc furnace, and the vacuum furnace mass spectrometers have been successfully used. The installation of a small digital computer makes the analyses fully autonomous. Apart from the computer, the measuring equipment comprises the analyzer, and all units required for sampling, preparation of the samples, calibration of the units, and monitoring the calibration gas.

26511 **APTIC NO. 48117**

Smith, Edwin E.

MEASURING RATE OF HEAT, SMOKE AND TOXIC GAS RELEASE. Fire Technol., 8(3):237-245, Aug. 1972. 1 ref. (Presented at the National Fire Protection Association, Annual Meeting, Philadelphia, Pa., May 16, 1972.)

Equipment and procedures are described for experimentally evaluating hazard factors in fires such as combustibility, smoke release rate, and toxic gas release rate. The materials involved in a fire must be analyzed before a fire hazard evaluation is attempted. Combustible-noncombustible ratings are inadequate for calculating fuel loading, and fuel loading is not a good measure of fire hazard. The use of release rate data is suggested for defining fuel loading and for analyzing the initiation and propagation phases of a fire system. A combustibility apparatus is described comprising a flow system in which release rates are determined by measuring the concentration of heat, smoke, and toxic gases leaving an environmental chamber containing the sample. The mathematical relationship is the concentration times air flow rate equals the release rate. To determine the smoke release rate, the concentration equals the number of smoke particles/cu ft air where one particle/cu ft air reduces the transmission of light through 1 ft of this air by 10%. A photocell was mounted above the outlet stack to monitor the optical density. For toxic gas release, concentration is the weight of toxic gas/cu ft air. Spectrophotometric or gas chromatographic analyses are used to monitor the toxic gases. A wide variety of materials were evaluated experimentally and a hypothetical fire in a ranch-style home was evaluated theoretically.

26512 **APTIC NO. 47845**

Sugimae, Akiyoshi, Toshio Hasegawa, and Ken Matsuo

TRACE METALS IN SUSPENDED PARTICULATES (IX) - DETERMINATION OF MERCURY IN THE AIR BY THE PHOTOMETRIC ANALYSIS METHOD. (Fuyu funjin-chu no kinzoku seibun (dai 9 ho) - hakko bunko bunseki ho ni yoru taiki-chu no suigin no teiryo). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 97. (Nov. 7-9, Paper 52.)

The non-flame atomic absorption method is largely used for measurements of water pollutants and has not been applied to measurements of mercury in the atmosphere. This was tested by adjusting the atmosphere by the use of a boiler cup electrode in order to improve the sensitivity of mercury, and a good result was obtained. This is a method that requires no pretreatment of the test material, and accuracy is dependable and has no effects of coexisting materials. Mercury was sampled by a filter holder with an activated carbon filter; the material air was sucked in at the rate of 30 l/min for 5-7 days. The filter eliminated 99.7% of iodine steam at 9-36 cm/sec. The filter was punched with 4 mm diameter, and 12 of these pieces (equivalent to 11.4% of the total filter space) were packed in an electrode cup. Then 50 microliter of a standard element solution (arsenic 100 ppm) was added. After drying, a boiler cup was inserted and the test material electrode was ready. A test electrode and a standard electrode were placed opposite graphite electrodes and were charged with electric current. Mercury was photographed and measured. The range of measurements were 0.002 to 0.05 micrograms/cu m (samplings from 7 days). When higher sensitivity is required, a double photography can be applied and the lower limit can be expanded to 0.001 micrograms/cu m.

26513 **APTIC NO. 47846**

Sugimae, Akiyoshi, Toshio Hasegawa, and Ken Matsuo

TRACE METALS IN SUSPENDED PARTICULATES (X). (Fuyu funjin chu no kinzoku seibun (dai jippo)). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 98. (Nov. 7-9, Paper 53.)

In order to establish an accurate method of measurement of various traceable metals collected from suspended particulates on a membrane filter, a photometric method was applied and various operational conditions were examined. Representative metals in suspended particulates were iron, manganese, lead, vanadium, silicon, calcium, aluminum, and copper. Samples were taken by a filter holder with a membrane filter, and the test air was passed through at 30 l/min after 24 hours. The test filter was punctured by a 5 mm diameter punch and placed on a 6mm diameter graphite flat electrode. Methyl-ethyl-ketone was dropped and the dusts were dispersed. After drying, 50 a microliter standard solution (cobalt 10 ppm, sodium 4,000 ppm) was poured, dried, and the test electrode was ready. The test and standard electrodes were charged for 15 sec by a direct arc 10 A. Simultaneous measurements of various elements were possible. Material dispersion and contamination were totally avoided, and a speedy and accurate measurement method was established. The parameters were 4.6 to 14.4%. Actual measurements are presented in a table.

26514 **APTIC NO. 47902**

Suzuki, Shigetsugu and Takayo Morimoto

ANALYSIS OF HEAVY METALS IN ATMOSPHERIC SUSPENDED PARTICULATES. (Fuyu ryushijo busshitsu chu kinzoku no bunseki ho no kento ni tsuite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 99. (Nov. 7-9, Paper 54.)

In order to evaluate the efficiency of a low temperature burning method of metal analysis over the wet method, various methods were tested on suspended particulates. Comparisons of analyses by acid concentration changes, and comparisons of reagents such as chlorine analyzers, chelate agents, and organic catalysts were made. After burning the test material at a low temperature, chlorine, chlorine and hydrogen peroxide, nitric acid, nitric acid and hydrogen peroxide were added, and metals were extracted on a bath without a cooler. For the wet method, chlorine concentrate, hydrogen peroxide, dilute chlorine and hydrogen peroxide were added and analyzed on a bath using a circulation cooler; nitric acid, nitric and sulfuric acids, and nitric acid and perchloric acid were extracted on asbestos. They were all filtered through 3G3 glass filters and concentrated. Iron, cadmium, copper, and manganese were analyzed by the atomic absorption method. Only iron extracts were compared. The best result was obtained when using the wet method with dilute chlorine and hydrogen peroxide, nitric acid and perchloric acid; the previously used method of wet analysis using nitric acid was the next best. The use of sulfuric and nitric acids produced the poorest results.

26515 **APTIC NO. 47832**

Temkin, S. and J. M. Reichman

A NEW TECHNIQUE TO PHOTOGRAPH SMALL PARTICLES IN MOTION. Rev. Sci. Instr., 43(10):1456-1459, Oct. 1972. 5 refs.

A new method to photograph small particles in motion was developed. It provides several consecutive backlighted photographs of a moving particle on a single negative, so that particle trajectories are easily analyzed; the shape of the particle is recorded on each exposure. The technique requires on special equipment other than that commonly used to photograph small particles, but does require better synchronization and cannot be used for all particle sizes. In the case of liquid droplets falling in air, the method is suitable for droplets 100 micron in diameter or larger. The feasibility of the method was demonstrated by recording the trajectories of a droplet falling with and without the effects of a horizontal electric field. (Author abstract modified)

26516 **APTIC NO. 47816**

Thomas, Jess W. and Lawrence E. Hinchliffe

FILTRATION OF 0.001 MICRON PARTICLES BY WIRE SCREENS. Aerosol Sci., 3(5):387-393, Sept. 1972. 7 refs.

The efficiency of four wire screens in filtering a radium-A aerosol was determined. The aerosol consisted of particles of about 0.001 micron diameter. Efficiencies of about 5-95% were obtained at air velocities from 5-50 cm/sec. Test results were correlated by considering the screens to be assemblies of very short diffusion tubes. The semi-empirical screen efficiency equation developed correlated screen efficiency results obtained by other investigators. (Author abstract)

26517 **APTIC NO. 47922**

Vilner, T. A.

PHOTOMETRIC DETERMINATION OF CAUSTIC ALKALI AEROSOLS IN THE ATMOSPHERE. (Fotometricheskoye opredeleniye aerozoley yedkikh shchelochey v atmosfernom vozdukhe). Text in Russian. Gigiena i Sanit., no. 9:71-72, Sept. 1972.

A photometric method for the determination of caustic alkali aerosols is described. Rosolic acid in a mixture of alcohol with water is used as an indicator, which forms red to violet phenolates in the presence of an alkali. Maximal color intensity is reached 24 hours after the addition of rosolic acid, and the coloration of the solution is stable over 2 months when the solution is kept in closed container. Beer's law is valid in a range of 1-50 micrograms of hydroxide anion, the sensitivity being 1 microgram of OH or 2.35 microgram of sodium hydroxide in 5 ml. As the sample is collected by filter, gases and vapors do not interfere with the determination, but acid aerosols do. The determination is made against a calibration curve to be set up for a given set of filters.

26518 **APTIC NO. 48340**

Vitek, Jan

COMPARISON OF EFFECTIVENESS OF ELUTRIATORS OF TWO-STEP DUST SAMPLERS OF CZECHOSLOVAK PRODUCTION MARK DP 20 AND DP 50. (Strovnani ucinnosti elutatoru dvoustupnovych prachomeru cs. vyroby DP 20 a DP 50). Text in Czech. Pracovni Lekar (Prague), 24(7):257-262, 1972. 15 refs.

Dust samplers DP 20 and DP 50 (DP 50 samples a 2.5 times greater quantity of dust in a unit of time) are used primarily in coal mines for the measurement of the concentration of the respirable dust fraction and of the total concentration of suspended dust. Both instruments use a cyclone with axial air intake as elutriators to separate the non-respirable fraction of dust. To check the effectiveness of elutriators of the two instruments, comparative measurements of coal dust concentrations were carried out by installing an analytical PC filter on each of the two instruments and also on a standard single step dust sampler so that the respirable dust fraction intercepted on the filters could be compared. Results of measurements of total suspended coal dust particulates were practically identical on the two experimental and the one control instrument. The correlation between concentrations of the respirable dust fraction of both elutriators was lower than in the case of total suspended particulates but still statistically significant. The reason for this is in the circumstance that the respirable fraction comprises only about 5% of the total dust, thus the scattering of measurement results is affected by the weighing error especially in the area of the lowest concentrations of the respirable fraction. By extending the sampling time with the DP 20 instrument for as long as feasible, these measurement discrepancies can be minimized.

26519 **APTIC NO. 48162**

Vitez, Bela

IMPROVE YOUR SAMPLING TECHNIQUES. Pollut. Eng., 4(6):42-43, Sept. 1972.

Improving sampling techniques by eliminating errors in measuring the amount of pollutants is discussed. The principal mistakes made in measuring are in using: improper measuring devices or apparatus; faulty equipment; wrong measurement techniques and methods; unskilled personnel; and improperly reported test data. When sampling a gas stream, the accuracy of particle or gas sampling depends upon: the difference of stack and nozzle gas velocities; particle size, nozzle diameter; number and length of sampling; division of gas flow area; handling of equipment; and the accuracy of the equipment and report of test. Examples are given of problems and errors resulting from wrong measuring and handling of equipment.

26520 **APTIC NO. 47814**

Williams, I. and A. B. Hedley

THE CHOICE, DESIGN AND PERFORMANCE OF A MULTICHANNEL AEROSOL PARTICLE COUNTER. Aerosol Sci., 3(5):363-375, Sept. 1972. 29 refs.

Currently available automated particle counting techniques are discussed, as well as the design and construction of a low cost multi-channel particle counting system. The unit counts airborne spherical particles between 0.5 and 4 micron in diameter, in nine size ranges, and a further channel records the total count of particles above 4 micron in diameter. Performance of this unit is discussed with reference to measurements of water and carbon tetrachloride aerosols. A feature of the unit is that other particle size ranges may be counted, using the ten available channels, provided that the unit is recalibrated with monodisperse spheres of known diameter. Further improvements are mentioned. The apparatus is a photocounting instrument which uses central dark spot illumination and detects small angle forward scattered light. (Author abstract modified)

26521 **APTIC NO. 48165**

Zoccolillo, L., A. Liberti, and D. Brocco

DETERMINATION OF POLYCYCLIC HYDROCARBONS IN AIR BY GAS CHROMATOGRAPHY WITH HIGH EFFICIENCY PACKED COLUMNS. Atmos. Environ., 6(10):715-720, Oct. 1972. 7 refs.

A simplified and relatively rapid method based on gas chromatographic determination preceded by thin layer chromatography was developed to determine polycyclic aromatic hydrocarbons in atmospheric particulate matter. Experimental procedures and test results are presented. A 5-meter gas chromatographic column (60-80 chromosorb G 1% w/w SE 52) is comparable in terms of resolution and time of analysis to a capillary column. (Author abstract modified)

1971

26522 **APTIC NO. 48397**

Ministry of International Trade and Industry, Tokyo (Japan), Industrial Standards Committee

JAPANESE INDUSTRIAL STANDARD METHOD FOR DETERMINATION OF TOTAL SULFUR OXIDES AND SULFUR DIOXIDE IN FUEL GAS. JIS K 0103-1971. Feb. 1, 1971. Translated from Japanese. 95p.

A standard was developed for sampling and analyzing the total sulfur oxides and sulfur dioxide in waste gases from fuel combustion. The analytical methods for total SOx included the neutralization method (titration), the arsenazo III method, and the barium chloranilate method photoelectric spectrophotometry or photometry). The iodine titration method was recommended for SO2 analysis. Continuous analysis could be effected by the solution conductivity method, the infrared gas analysis method, and the gas detection tube method. Design criteria, instrumentation, sampling techniques, ranges of sensitivity, experimental procedures, reagents, calibration and standardization methods, and mathematical calculations are examined.

26523 **APTIC NO. 48392**

Berlyand, M. Ye. and N. Sh. Volberg

TEMPORARY PRECEDURAL DIRECTIVES FOR DETERMINING THE CONTENT OF POLLUTANTS IN THE ATMOSPHERE. (Vremennyye metodicheskiye ukazaniya po opredeleniyu soderzhaniya primesey v atmosfere). Hydrometeorological Service of the USSR, Moscow, 1971. 6 refs. Translated from Russian. 120p.

Systematic and efficient air pollution monitoring must include, along with air sampling and analysis for atmospheric pollutants, meteorological observations. Various techniques for air pollution monitoring and meteorological observations are reviewed. Sampling methods are reviewed for sulfur dioxide, hydrogen sulfide, carbon disulfide, nitrogen dioxide, phenol, hydrogen fluoride, chlorine, dust, soot, and carbon monoxide. Laboratory techniques, calibration, instrumentation, reagent preparation, and sample analysis are examined for photocolorimetric analysis (spectrophotometry and colorimetry). Equipment and techniques for measurements of wind speed and direction, air temperature, and humidity; criteria for determinations of weather characteristics (sky cover, haze, mist, rain, snow, fogs, and solar radiation); plume characteristics; and recording methods are also reviewed.

26524 **APTIC NO. 48144**

Inaba, Fumio

IMPROVEMENT OF LASER ELECTRONIC TECHNOLOGY FOR THE MEASUREMENT OF ENVIRONMENTAL POLLUTION. (Kogai sokutei no tameno reiza denshi gijutsu no shinten). Text in Japanese. Ohm, 58(11):1-12, Oct. 1971. 31 refs.

Laser-radar (lidar) is discussed. The laser-Raman scattering method can be used for remote analysis and detection of atmospheric pollution. Lidar can be coupled with fluorescence and resonance dispersion using a spectrophotometer to measure pollution. Lidar is advantageous for air pollution measurements since a three-dimensional analysis can be made. Laser-Raman-radar, using Raman scattering, was introduced as a new lidar method for the remote measurement and analysis of pollutants. Various Japanese research institutes and universities have begun to use Mie scattering to measure air pollution and atmospheric phenomena.

26525 **APTIC NO. 48361**

Krost, K. J., J. A. Hodgeson, and R. K. Stevens

THE FLAME CHEMILUMINESCENCE DETECTION OF NITROGEN COMPOUNDS. Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Div. of Chemistry and Physics, 28p., Sept. 1971. 11 refs.

The application of flame chemiluminescence detection to the determination of atmospheric nitrogen compounds is examined. A hydrogen-rich oxy-hydrogen flame was used as the medium for excitation of characteristic nitrogen bands. The emission in the reaction between atomic hydrogen and nitric oxide was viewed photometrically above the flame at 690 nm. The experimental apparatus and procedures, design parameters, and response characteristics are examined. The detection limits of the apparatus are 0.150 ppm for nitrogen oxides and 0.004 ppm for sulfur dioxide. The method can also be applied to ammonia and amines. (Author abstract modified)

26526 **APTIC NO. 48370**

Martin, Robert M.

CONSTRUCTION DETAILS OF ISOKINETIC SOURCE-SAMPLING EQUIPMENT. Environmental Protection Agency, Research Triangle Park, N. C., Air Pollution Control Office, Rept. APTD-0581, 37p., April 1971.

NTIS: PB 203060

This manual for use in building isokinetic source-sampling equipment includes meter box construction details, sample box construction, umbilical cord construction, pitobe construction, list of glassware parts, and calibration procedures for orifice and meter.

26527 **APTIC NO. 48379**

Okita, Toshiichi and Maki Imagami

MEASUREMENT OF OZONE BY CHEMILUMINESCENT METHOD. (Echirenho o mochiita taikichu ozon nodo no sokutei to okishidanto nodo to no hikaku). Text in Japanese. Koshu Eiseiin Kenkyu Hokoku (Bulletin of the Institute of Public Health), 20(4):207-211, Dec. 1971. 3 refs.

Ozone measurements were taken using a newly manufactured chemiluminescence ozone monitor. The test gas was led through a solenoid valve and a flowmeter into a mixing chamber. Ethylene gas was led into a mixing chamber through an annenuater, a solenoid, and a flowmeter. The ozone in the test air reacted to the ethylene gas and radiated with a peak about 430 nm. The light was amplified and converted into an electric signal which was recorded automatically. After a lab test, a field test was conducted in July 1971, for 10 days, outside metropolitan Tokyo. The chemiluminescence meter and an oxidant meter using neutral potassium iodide colorimetry were used. Nitric oxide and nitrogen dioxide were measured for an hour each, using an automatic recorder. Excepting very few instances, oxidant concentration was higher than or equal to the level of ozone concentration. This was the effect of NO2. No definite relationship was found between the weather conditions and the level of ozone.

AIR QUALITY MEASUREMENTS

1972

26528 **APTIC NO. 47941**

Suginami Ward Office, Tokyo (Japan), Public Nuisance Section

AIR POLLUTION MEASUREMENT SURVEY. (Taikiosen sokutei chosa). Text in Japanese. Rept. 7, 178p, Aug. 1972.

Carbon monoxide, lead, and traffic were surveyed at seven selected spots in Suginami Ward, Tokyo in order to clarify the actual state of air pollution with regards to automotive exhaust gas. For analysis of carbon monoxide, air was sampled by the 12-linked sampler for 8 consecutive hours from 1000 to 1800 hours and the sample for each hour was packed in a vinyl bag. The analysis was done by means of an infrared analyzer. The concentration of lead was measured by atomic absorption analysis. The quantity of automobile traffic was counted by a counter for 10 minutes of each 1-hour period, 1000-1100 hours, 1300-1400 hours, and 1700- 1800 hours. Large-sized vehicles (buses and trucks) and small-sized vehicles (except two-wheelers) were separately counted. Monthly averages of the respective data were shown by the location of the survey spot. The survey results were presented in detail in 19 tables. Values of carbon monoxide and lead concentration varied even at the same measuring spot, depending on weather and other environmental conditions. This survey, conducted once a month, could not produce any definite seasonal trends or characteristics of the respective measuring spots. Generally speaking, however, concentrations of CO and Pb tended to increase with a greater quantity of the traffic, while their values were generally lower in the area behind the road than along the roadside.

26529 **APTIC NO. 47951**

Ministry of International Trade and Industry (Japan)

A REPORT ON THE SURVEY OF THE ENVIRONMENTAL CONDITIONS OF THE OITA INDUSTRIAL AREA. (Oita chiku konbinato kankyo hozen chosa hokokusho). Text in Japanese. 42p., Dec. 1972.

Sulfur oxides concentration in Oita area had a tendency to increase up to 1969. Since then, the yearly average has stayed in the area of 0.022 ppm with a very slight decrease. The level is still lower than the environmental standard. With the increased industrial activities and further development plans of the area, a considerable increase of SOx emission is expected in the future. Settling particles has been in the area of 6-7 t/sq km/day since 1965. Suspended particulates lack data, but seem to show high index in January to March. As pollution preventive measures, cooperative utility facilities, and cooperative low-sulfur fuel storage are in progress. Various statistical data on the plans of the industries, transitions of production, fuel consumptions, emissions, and measurements are given by tables and charts.

26530 **APTIC NO. 47973**

Ministry of International Trade and Industry (Japan)

A REPORT ON THE SURVEY OF THE ENVIRONMENTAL CONDITIONS OF THE MIZUSHIMA INDUSTRIAL AREA. (Mizushima chiku konbinato kankyo hozen chosa hokokusho). Text in Japanese. 61p., Dec. 1972.

Air pollution measurements were taken at 19 locations in the Mizushima area, 18 of which are connected with a telemeter system and conduct continuous monitoring. The number of locations which failed to pass environmental standards in 1967 were three out of three locations, five out of five measurements in 1968, five out of 11 in 1969, three out of 19 in 1970, and one out of 19 in 1971. In 1971, the sulfur oxide concentration in all but one small area was far below the current environmental standard, and in 1972 further improvement is expected. A notable decrease in the settling particle quantity occurred in 1971; in almost all areas, measurements were less than 10 t/sq km/mo. Damages to taro potatoes, gingers, scallions, and another kind of potatoes occurred in 1971 costing the farmers approximately $100,000. The causes are not clear, however, the ozone concentration in the air probably had something to do with it. Other data on the area survey are presented in tables, charts, and maps.

26531 **APTIC NO. 47974**

Ministry of International Trade and Industry (Japan)

A REPORT ON THE SURVEY OF THE ENVIRONMENTAL CONDITIONS OF THE KASHIMA INDUSTRIAL AREA. (Kashima chiku konbinato kankyo hozen chosa hokokusho). Text in Japanese. 55p., Dec. 1972.

The annual average of sulfur oxides concentrations in the Kashima area is between 0.012 and 0.02 ppm, far below the present environmental standard. More recently, however, temporary emissions of high concentration pollutants have been noted with the increase of loads. No emergency alert has been issued as yet. The SOx concentration has stayed at approximately the same level over the years, with a slight increase. Suspended particulate concentration monthly averages are 0.01 to 0.03 mg/cu m. Settling particles have increased gradually since 1968, partially due to the sandy earth quality of the area and to the construction works in progress. At present, the quantity is 8-11 t/mo/sq km. Annual epidemiological investigations on respiratory functions and eye and general health examinations since 1965 have not discovered any significant morbidity in the area or health impairment due to air pollution. Preventive measures by individual industries include installations of high stacks (presently 42, including 14 stacks higher than 100 m; 1975 target 60 stacks, including 21 stacks higher than 100 m), installations of electrostatic precipitators and bag filters. In the electric power industries, the precipitators will be increased from the present three to 12 systems; steel industries will increase from the present 11 to 23 by 1975. Presently, one desulfurization system of stack gas is in operation; by 1975, two more systems will be installed.

26532 **APTIC NO. 47975**

Ministry of International Trade and Industry (Japan)

A REPORT ON THE SURVEY OF THE ENVIRONMENTAL CONDITIONS OF THE TOMAKOMAI INDUSTRIAL AREA. (Tomakomai chiku knobinato kankyo hozen chosa hokokusho). Text in Japanese. 56p., Dec. 1972.

Continuous monitoring of sulfur dioxide is being conducted at seven locations in Tomakomai; sulfur oxide measurements are taken by the lead dioxide method at 25 locations; settling particles are measured at seven locations; and hydrogen fluoride is measured at 13 locations. The SOx measurements have stayed on about the same level since 1967. The central area of the city has a higher concentration than the coastal industrial region and other districts of the city. In view of the fact that the wind from the shore toward the center city is only 3 to 5% throughout the year, the pollutants from the coastal area do not affect the environment in the city as much as the paper and pulp industries in the city center. The SO_2 measurements by continuous monitoring are much below the environmental standard. Ninety percent of SO_x emission and dusts seem to come from the paper and pulp industries and the electric power industry. The SO_x emission in 1972 was 1498 N cu m/hr, and it is expected to grow to 3127 N cu m/hr in 1975. These industries are planning to solve problems by building high stacks. The non-ferrous metal industry is planning to use low-sulfur fuels and decrease the average emission concentration by 40% by 1975. The electric power industry plans to decrease its SO_x emission only by 10% for the same period. A further consideration and more stringent countermeasures are advised.

26533 APTIC NO. 47976

Ministry of International Trade and Industry (Japan)

A REPORT ON THE SURVEY OF THE ENVIRONMENTAL CONDITIONS OF THE CHIBA INDUSTRIAL AREA. (Chiba chiku konbinato kankyo hozen chosa hokokusho). Text in Japanese. 60p., Dec. 1972.

The air pollution conditions are improving gradually in the Chiba area. The averages of sulfur dioxide concentration in 1971 at 31 locations ranged from 0.035 ppm to 0.016 ppm, which was within the environmental standard. These results were brought about by the promotion of collectivization of stacks and high stacks, and the use of low sulfur fuels. Settling particle measurements at seven locations between 1969 and 1971 decreased gradually, especially at the most heavily polluted district in 1969, which dropped from 24.47 t/sq km/mo to 16.18 t/sq km/mo. Suspended particulates have not shown much improvement according to the measurements at seven locations. The morbidity of respiratory diseases of inhabitants were investigated in 1971 by the BMRC questionnaire, and a high morbidity rate was reported. In May 1972, detailed health examinations were initiated in heavily polluted areas; a city ordinance was issued on a relief program of health damages caused by air pollution. As of Aug. 10, out of 183 examinees (the total number to be examined: 753), 98 persons were diagnozed as patients, in the ratio of 37 chronic bronchitis, 45 bronchial asthma, seven asthmatic bronchitis, and nine emphysema cases. As for the damages on agricultural produce, fluoride damages on rice plants have been reported in July 1969 and 1970.

26534 APTIC NO. 48376

Los Alamos Scientific Lab., N. Mex.

NONRADIOACTIVE MATERIALS. In: Environmental Monitoring in the Vicinity of the Los Alamos Scientific Laboratory. July through Dec. 1971. p. 17, 1972.

A sample of 24-hour duration was taken once per week at the Los Alamos Scientific Laboratory by drawing air at about 1500 l/min through a glass fiber filter. These filters were then analyzed for suspended particulate matter, for benzene soluble organic material, and for selected metals such as cadmium and lead. A similar sampling arrangement is used with a Whatman No. 41 filter for airborne beryllium measurements. Results of these measurements are compared with the ambient air quality standards of New Mexico.

26535 APTIC NO. 47982

Balabaeva, L. and G. Petrova

CONTAMINATION OF ATMOSPHERIC AIR WITH FLUORINE COMPOUNDS AND THEIR EXCRETION IN URINE OF PERSONS. (Zam rsyavane na atmosferniya v zdukh s fluorni c yedineniya i izl chyaneto im s urina pri khora). Text in Bulgarian. Khig. Zdraveopazyane, 15(2):162-168, 1972. 27 refs.

Silicon tetrafluoride (SiF_4) and Hydrogen fluoride (HF) were determined in 349 and 347 air samples, respectively, taken in four locations of the Dimitrograd city area with a superphosphate and a cement producing industry. Samples were collected 5 days each month between March and November of 1970. Of 347 samples, 19.2% had an average of 0.011 to 0.013 mg HF/cu m exceeding by four times the maximum allowable concentration (MAC) value of 0.02 mg/cu m. Highest HF concentrations reaching 0.058-0.081 mg/cu m were found at locations closest to the superphosphate plant. Of the 349 air samples, 3.4% exceeded the SiF_4 MAC of 0.02 mg/cu m and maximum figures ranged from 0.036 to 0.053 mg SiF_4/cu m, while average values of 0.008 mg SiF_4/cu m were found, generally. Urinary excretion of fluorine compounds in highschool students 12 to 14 years old exceeded 60 micrograms % in fluorine levels in 32% of the Dimitrovgrad city group, compared to an age-related group of children from Sofia with 42.8 micrograms % fluorine excretion.

26536 APTIC NO. 48367

Ballard, L. F. and L. K. Matus

A STUDY OF CORRELATIONS OF OZONE AND SULFUR DIOXIDE. (FINAL REPORT). Research Triangle Inst., Research Triangle Park, N. C., Environmental Protection Agency Contract 68-02-0257, RTI Proj. 41U-98-93, EPA-R3-72-013, 14p., Sept. 1972. 4 refs.

NTIS: PB 212478

Air quality data collected in Los Angeles and St. Louis were used to determine the correlation between ozone and sulfur dioxide concentrations in ambient air. Ozone concentrations were measured using the chemiluminescent reaction between ozone and ethylene. SO_2 was measured by a flame photometric detector. A linear relation between O_3 and SO_2 concentrations was suggested by the Los Angeles data only. The multiple correlations were not consistently significant, and interpretation was difficult because of the dependence of these variables on gas phase reactions involving nitrogen dioxide, water vapor, and other gases as well as the variability of instrumentation response and the uncertainty of SO_2 emission source distribution effects.

26537 APTIC NO. 48225

Bourelly, Th.

AIR POLLUTION IN A PETROLEUM REFINERY SURROUNDING AREA. THIRD MEASUREMENT CAMPAIGN (SEPT. 1, 1970 - AUG. 31, 1971). (Pollution atmospherique autour d une raffinerie de petrole. Troisieme campagne de mesure (1 er septembre 1970 - 31 aout 1971)). Text in French. Pollut. Atmos (Paris), 14(55):243-251, July-Sept. 1972.

Results of acid pollution and smoke measurements performed in a Vernon region petroleum refinery area during the Sept. 1, 1970 Aug. 31, 1971 period are presented. The annual average acid pollutant and smoke concentration was 20 micrograms/cu m, largely on the same level as in the previous years. The monthly averages of the acid pollutant and smoke concentrations were highest in January with 32 and 29 micrograms/cu m, respectively, with peak values of 214 and 168 micrograms/cu m. The chlorine and hydrochloric acid concentrations had an annual average of 3 micrograms/cu m with a maximum of 48 micrograms/cu m. Variations in the pollution level in the Vernon area were determined by local factors rather than by the effect of the petroleum refinery.

26538 APTIC NO. 48303

Eichmeier, J., H. Ryssel, and R. Arm

MEASUREMENT OF THE CONCENTRATION OF SMALL IONS, LARGE IONS, AND CONDENSATION NUCLEI IN AIR-CONDITIONED UNDERGROUND ROOMS. (Messung der Kleinionen-, Grossionen- und Kernkonzentration in unterirdisch gelegenen klimatisierten Raeumen). Text in German. Arch. Meteorol. Geoph. Bioklimatol., Ser. B., 20(1):89-99, 1972. 21 refs.

The concentration of small ions, large ions, and condensation nuclei was measured in underground rooms with an electronic particle counter and a six-channel dot recorder. The particle concentration in air conditioned rooms was determined by the air conditioner. Upon the switch-on of the air conditioner, the number of negative large and small ions dropped considerably. The relatively large surplus of positive large and small ions was further increased by the additional production of positive ions by the air conditioner. The diurnal variation of the particle concentration was completely wiped out by the effect of the air conditioner. The extent of the particle concentration in air-conditioned underground rooms was about the same as in normal above-ground rooms. In the center of a large city, the large ion concentration in a normal above-ground room may fluctuate between 1000 and more than 10,000/cu cm, depending on the degree of air pollution; the nuclei concentration between 10,000 and more than 100,000/cu cm. With closed windows the values are generally lower. The small ion concentration fluctuates between about 100 and 500/cu cm at an open window, and between 300 and 900/cu cm at a closed window.

26539 **APTIC NO. 48219**

Godin, Gaetan, Geoff Wright, and Roy J. Shephard

URBAN EXPOSURE TO CARBON MONOXIDE. Arch. Environ. Health, 25(5): 305-313, Nov. 1972. 16 refs.

In Toronto, 500 grab samples of air were collected during normal urban life and were analyzed for carbon monoxide by infrared spectrometry. Concentrations were correlated with sunshine, rainfall, wind speed, and traffic density using nonparametric and multiple regression techniques. Local traffic density (td) accounted for 63% of the variance; equations based on td describe the CO exposure (Log (chi + 1) ppm) encountered by pedestrians (0.59 + 0.133 td) and cab drivers (0.92 + 0.086 td). Attenuation away from busy streets was rapid. In downtown offices, concentrations followed the general atmospheric pattern. Smoking can bring indoor concentrations above permitted 24-hour levels. The effect of vehicle ventilation provided by a heater fan was tested in a new and relatively air-tight car. Carbon dioxide concentrations in crowded subway cars were as high as 0.08-0.18%. The CO concentrations were 3.4 + or 2.6 ppm on open sections of track and 5.5 + or 3.2 ppm in the tunnels. Carbon monoxide concentrations were unrelated to sulfur dioxide, total oxidant, and nitrogen oxides concentrations; however, as might be anticipated from their common prime source, there was a significant positive correlation with hydrocarbons; also, suspended particulate matter varied inversely with CO which might reflect thermal inversion effects. Air quality criteria and current air quality standards are discussed. (Author abstract modified)

26540 **APTIC NO. 47918**

Goto, Takao

AIR POLLUTION NEAR AN IRONWORKS (II) (ANALYSIS OF DUSTS). (Seitetsujo shuhen no taiki osen (sono II) (Shuto shite baijin no bunseki ni tsuite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 8. (Nov. 7-9, Paper 43.)

The dusts from the iron ore were examined from the settling particles and suspended particulates gathered in the vicinity of an ironwork factory. Settling particles sifted through a 100-mesh sieve and filtered suspended particulates were used as the test materials. Neutron radioactivation was used on 10 to 50 mg of each material, and the radioactive product of each element was measured by the GE(LI) detector. The RI fluorescent X-ray analysis was also given. The results of the analyses showed that 19 of the tested 24 elements had peaks in particle sizes and concentration. This signified that they were related to the proximity of the emission source. Dusts contained silicon dioxide, iron, phosphorus, sulfur, copper, arsenic, manganese, aluminum, antimony, and other compounds.

26541 **APTIC NO. 47830**

Hoffman, Gerald L. and Robert A. Duce

CONSIDERATION OF THE CHEMICAL FRACTIONATION OF ALKALI AND ALKALINE EARTH METALS IN THE HAWAIIAN MARINE ATMOSPHERE. J. Geophys. Res., 77(27):5161-5169, Sept. 20, 1972. 21 refs.

Approximately 200 atmospheric particulate samples were collected over a 1 year period on a 20-meter high tower on the windward coast of Oahu, Hawaii. The particulate samples were analyzed by atomic absorption for sodium, magnesium, calcium, potassium, and strontium. Correlation coefficients, regression equations, and elemental ratios were calculated for all the atmospheric metal concentrations to determine interelemental relationships. Large scale chemical fractionation of Mg, Ca, K, and Sr relative to Na was not determined in the vicinity of Hawaii. Standard deviations of the slope of the regression lines indicated the following enrichments in the sea salt fraction of the aerosols relative to Na: Mg, -2% + or - 3%; Ca, -3% + or - 17%; K, 5% + or - 36%; Sr, -11% + or - 28%. (Author abstract modified)

26542 **APTIC NO. 47937**

Ikeda, Kozo, Fumio Kotake, and Takeatsu Sasaki

ONSITE INVESTIGATION OF THE AIR ENVIRONMENT IN SPECIFIC BUILDINGS. (Tokutei kenchikubutsu ni okeru kukikankyo no jittaichosa ni tsuite). Text in Japanese. Preprint, Ministry of Health and Welfare (Japan) and Japan Environmental Sanitation Center, Tokyo, p. 110-112, 1972. (Presented at the National Environmental Sanitation Meeting, 16th, Niigata, Japan, Oct. 19-20, 1972.)

With enforcement of the new law concerning preservation of a sanitary environment inside a building effective Oct. 12, 1970, an investigation was conducted to obtain actual data of the air environment in selected buildings located in Sapporo, Hokkaido, hoping to use them as the future guidance basis. The factors measured were temperature, humidity, air current, carbon dioxide, carbon monoxide, and suspended dust. Twenty-two shops/offices, three hotels, two department stores, two game centers, and two schools were investigated. Only 84% of the buildings surveyed met the specified criteria for temperature in the summer and 93% in the winter. Only 77% were within the standards for humidity in the summer and 94% failed to meet the standards in the winter. Sixty-one percent of the buildings had more suspended dust than allowed in summer and 45% in winter. The hotels, shops, department stores and game centers had more dust in the summer than the winter, while the office buildings had equal amounts of suspended dust throughout the year. The increase of the dust in the former in the summer should be attributed to dirt and sand dust brought in by visitors; in the winter the cold climate of Sapporo has no such dust. The fact that the office buildings have a consistent amount of the dust throughout the year indicates that there is a different kind of dust from that in the shops, department stores, and similar buildings.

26543 **APTIC NO. 48284**

Koyama, Tahachiro and Kokei Takata

STATE OF SETTLING PARTICLES IN RECENT FIVE YEARS (1965-1969) IN THE HARIMA REGION. (Saikin gonenkan (1965-1969) no Harima chiiki no koka baijin no jittai). Text in Japanese. Hyogo-ken Kogai Kenkyusho Kenkyu Hokoku (Rept. Public Nuisance Res. Inst. Hyogo Prefect.), no. 3:14-17, 1972.

The settling particles in the Harima coastal area including Himeji city and Akashi city have been measured since 1965 using deposit gauges. In the subsequent five years, the total amount of settling particles drastically decreased in the industrial belt along the coast, and tended to decrease in the residential and commercial areas in the suburbs. There was a clear seasonal fluctuation pattern of low quantity between October and February (3-7 t/sq km/mo), and high between April

and July (7-16 t/sq km/mo) depending on the area, but the geographical differences were not clear. The number of soluble elements in the settling particles was small in the iron and steel industrial areas and was large in the chemical industrial areas. There was a significant correlation between the amount of soluble components and the rain quantity. The fluctuation index for monthly settling particles was high in the coastal industrial area. In examining the correlation between settling particles and the wind direction frequency, correlations between the wind direction and the total quantity and between the amounts of soluble and nonsoluble elements must be examined.

26544 **APTIC NO. 47813**

Lee, Robert E., Jr. and Stephen Goranson

NATIONAL AIR SURVEILLANCE CASCADE IMPACTOR NETWORK. I. SIZE DISTRIBUTION MEASUREMENTS OF SUSPENDED PARTICULATE MATTER IN AIR. Environ. Sci. Technol., 6(12):1019-1024, Nov. 1972. 10 refs. (Presented at the American Chemical Society, 162nd Meeting, Washington, D. C., Sept. 1971.)

A network of cascade impactors was set up to determine the particle size distribution of suspended particulate matter in air gravimetrically at the National Air Surveillance Network Continuous Air Monitoring Project stations in Chicago, Washington, D. C., Philadelphia, St. Louis, Cincinnati, and Denver. During 1970, samples were collected for a 24-hour period once every two weeks according to a prearranged schedule. The cascade impactor, which operates at a flow rate of 5-6 cu ft/min, the analytical methodology, and the computer processing of data are described. Results of the first year s operation indicate that suspended particulate matter in urban air is predominantly submicron in size. Individual and composite particle size distribution curves were approximately lognormal. Variations in the quarterly composites of mass median diameter, various size fractions less than or equal to 1 and 2 micron, and the degree of particle dispersion expressed by the geometric standard deviation generally followed seasonal patterns. Future expansion of the network is discussed. (Author abstract modified)

26545 **APTIC NO. 47828**

Lee, Robert E., Jr. and C. Frederick Smith

SIZE DISTRIBUTION OF SUSPENDED PARTICLES FROM LIGNITE COMBUSTION. Environ. Sci. Technol., 6(10):929-930, Oct. 1972. 5 refs.

Particle size distribution was measured in Ankara, Turkey, where low-quality, highly volatile lignite coal is the major fuel. The average particle size was predominantly greater than 1 micron in diameter. Compared to the submicronsized aerosols in the urban atmospheres of the United States and Great Britain, the total suspended particulate matter in Ankara presents less of an inhalation hazard for equivalent concentrations. (Author abstract modified)

26546 **APTIC NO. 47856**

Mamuro, T., Y. Matsuda, and A. Mizohata

ACTIVATION ANALYSIS OF AIRBORNE DUST (2) - SEASONAL AND GEOGRAPHICAL VARIATIONS OF VARIOUS ELEMENTS CONCENTRATION. (Taiki fuyujin no hoshaka bunseki (II) - kakushu genso nodo no kisetsu henka to chiikisa no kansoku). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 86. (Nov. 7-9, Paper 41.)

Monthly average concentrations for various elements in suspended particulates were measured at four locations in the Osaka area for 13 months between March 1970 and March 1971. Most elements showed peak concentration between November and December, and June, and the lowest concentration appeared in August. Zinc, arsenic, selenium, antimony, and thorium showed drastic fluctuations, and it was judged that the variation in industrial activities played a part in it. Iron, copper, An, and Sb were always high in one location which had been designated as a polluted area. But Se and As were high in one area, and hafnium, barium, lanthanum, and Th were always high in another area, showing geographical variations. According to the measurements taken in Aug. 1971, the emissions in the Osaka Bay coastal area seem to disperse northeastward. Correlations between various elements were studied. The main source of bromine, the concentration of which was high in June, is believed to be automobile exhaust gases.

26547 **APTIC NO. 47849**

Nakazawa, Makoto, Yoshio Saiki, T. Koshimizu, Koji Himi, Sabura Sugano, Yogi Yoshiko, Kazuyuki Takamatsu, and Yutaro Sekiguchi

A SURVEY ON ENVIRONMENTAL POLLUTION BY HEAVY METALS IN KANAGAWA PREFECTURE. (Kanagawa ken ni okeru taiki chu jukinzoku no osen bunpu). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 100. (Nov. 7-9, Paper 55.)

The data concerning heavy metals are very limited compared to those concerning sulfur oxides and suspended particulates. Simultaneous measurements of lead, cadmium, manganese, nickel, and iron were conducted at 22 locations in Kanagawa Prefecture using high volume air samplers. Measurements were taken six times a year; samples were taken from 8 am to 4 pm, 4 to 12 pm, midnight to 8 am. The analyses were done by atomic absorption spectrometry using MIBK-DDTC extractions. The 24-hour averages of measurements were as follows (expressed in micrograms/cu m and maximum in parentheses): 0.69 (2.8) of lead, 0.018 (0.076) of cadmium, 0.22 (0.68) of manganese, 0.11 (1.9) of nickel, 5.3 (15) of iron, and 0.20 (0.67) of copper. Generally, high concentrations were found in the Yokohama and Kawasaki industrial areas. Excepting nickel, all metals showed a high concentration between November and January, and the lowest concentration in July. There were no significant correlations between metals. Ground concentration was somewhat higher than the roof measurements. Dusts on the roads contained quantities of iron, zinc, and manganese in that order, but there were considerable geographical fluctuations.

26548 **APTIC NO. 48092**

Neustadter, Harold E., Steven M. Sidik, and John C. Burr, Jr.

STATISTICAL SUMMARY AND TREND EVALUATION OF AIR QUALITY DATA FOR CLEVELAND, OHIO, IN 1967 TO 1971: TOTAL SUSPENDED PARTICULATE, NITROGEN DIOXIDE, AND SULFUR DIOXIDE. National Aeronautics and Space Administration, Cleveland, Ohio, Lewis Research Center and Cleveland Air Pollution Control District, Ohio, NASA TN-D-6935, Rept. E-7006, Work Unit 770-18, 21p., Sept. 1972. 11 refs.

Air quality data for Cleveland, Ohio, for 1967 to 1971 were collated and subjected to a statistical analysis. Total suspended particulate concentrations were lognormally distributed; sulfur dioxide and nitrogen dioxide were reasonably approximated by lognormal distribution. Air quality standards for SO2 for Ohio were met only sporadically in isolated residential neighborhoods. Standards for total suspended particulates or NO2 were not met anywhere in Cleveland. A definite improvement in air quality has taken place in the industrial valley, while in the rest of the city only SO2 has shown consistent improvement. A pollution index (Polludex) is introduced which directly displays information regarding the degree to which the environmental air conforms to the mandated standards. It is a useful tool in air quality monitoring programs. Bar graphs are given for Polludex values for the three pollutants at various monitoring stations in the Cleveland area. (Author summary modified)

1971

26549 **APTIC NO. 47868**

Ibaragi Prefecture (Japan), Environmental Pollution Research Center

ANNUAL REPORT OF THE ENVIRONMENTAL POLLUTION RESEARCH CENTER OF IBARAKI-KEN. NO. 4. (Ibaraki-ken kogai gijutsu senta nenpo). Text in Japanese. 212p., 1971.

A telemeter system for monitoring the conditions of the Hitachi- Kashima areas was added to the Ibaraki Prefectural Environmental Pollution Research Center in 1971. This telemeter network includes four stable monitoring stations, one national monitoring station, one inversion layer monitoring station, one mobile station, and nine emergency warning stations in Hitachi and 21 such stations in Kashima. Monthly reports and annual reports are compiled from the data, environmental standard suitability ratios are calculated, and wind direction, wind velocity, and temperature are measured. Monthly averages of sulfur oxides in the Hitachi area in 1971 ranged from 0.02 ppm to 0.033 ppm, and the annual average was 0.028 ppm. In the Kashima area SOx averages ranged from 0.014 to 0.019 ppm mo, and the annual average was 0.017 ppm. Suspended particulate monthly averages in the Hitachi area ranged from 0.022 to 0.130 mg/sq m, and the annual average was 0.065 mg/sq m. In the Kashima area, particulate monthly averages ranged from 0.015 to 0.080 mg/sq m. A report of a traceable amount of cyanide brought on an investigation of the Kashima area dusts and atmosphere between Oct. 1971 and March 1972. Impinger and 2% sodium hydroxide solution were used for cyanide collection in the air, and a high volume air sampler was used for suspended particulates. The cyanide averages of 10 urban areas were three times higher than those of the Kashima area. About 85% of the air samples showed no signs of cyanide, and averag of traceable samples showed 1.4 micrograms cu m.

26550 **APTIC NO. 48440**

Ramel, R.

CARBON MONOXIDE LEVELS INSIDE THE MONT-BLANC TUNNEL DURING THE FIRST FOUR YEARS OF OPERATION. (Tunnel du Mont-Blanc. Pollution en oxyde de carbone pendant quatre annees d exploitation). Text in French. Pollut. Atmos. (Paris), 13(49):1-9, Jan.-March 1971. 2 refs.

Carbon monoxide measurements performed in the Mont-Blanc tunnel (length 11.6 km, altitude 1300 m, ventilation rate 600 cu m/sec, traffic peak 600-700 vehicles/hr) during 1965-1969 are evaluated. The mean value from a total of nine CO readings should be less than 150 ppm, while the reading of one of the five measuring instruments installed in the center of the tunnel should be less than 200 ppm to meet air quality standards. One of the four instruments installed at the ends of the tunnel is permitted to have readings up to 250 ppm. A CO level of 250 ppm, permissible for workplaces where light work is done over 2 hrs, produced a blood COHb level of 16.62%. However, clearing the tunnel takes only 15-20 min. and the limit of 150 ppm is exceeded in very few cases. An increase in the number of hours with CO levels close to 150 ppm increased each year since the tunnal has been in operation. The COHb level in tunnel operators was around 4.5 ml/l.

ATMOSPHERIC INTERACTION

1972

26551 **APTIC NO. 47977**

Japan Environmental Agency, Bureau of Atmospheric Safety

A PROGRESS REPORT ON AIR POLLUTION BY PHOTOCHEMICAL REACTIONS, SUMMER 1972. (Showa-47 nendo kaki ni okeru kokagaku hanno ni yoru taiki osen chosa chukan hokokusho). Text in Japanese. 58p., Dec. 1972.

A summary of the meteorological conditions and oxidant warning alert cases in the Tokyo and Yokohama area, the meteorological characteristics of the upper and lower skies of the Tokyo Bay area, ground temperatures, pollutant concentrations in various strata, and the results of photochemical reaction tests in a mobile smog chamber are discussed. For on-cite investigations, 16 measurements were taken at five locations in Tokyo and Kanagawa of nitrogen oxides, nitric oxide, hydrocarbons, and oxidants, by the chemiluminescence method and gas chromatography. Partial measurements were taken to see the changes of the compositions of hydrocarbons by the photochemical reaction and the fluctuations of aldehydes concentration. In all cases, the ozone concentration increased by the ultraviolet ray irradiation. The indexes ranged from the lowest of 0.06 ppm to the highest of 0.20 ppm. These figures were closely related to the concentrations of NOx and HC. Then the initial concentration of NOx was high, the maximum concentration of O3 was also high; when the initial concentration of HC was low, the highest concentration of O3 was low.

26552 **APTIC NO. 48264**

Atmospheric Radiation Working Group

MAJOR PROBLEMS IN ATMOSPHERIC RADIATION: AN EVALUATION AND RECOMMENDATIONS FOR FUTURE EFFORTS. Bull. Am. Meteorol. Soc., 53(10):950-956, Oct. 1972. 3 refs.

The present status and the major unsolved problems of the following aspects of atmospheric radiation are outlined: radiative transfer in realistic atmospheres; radiative energy budgets; radiative properties of atmosphere and surface; radiative instruments and measurements; and radiative interactions in dynamic systems. Recommendations are made for actions that can be taken to fill the gaps in the present knowledge of atmospheric radiation. Aspects such as clouds, aerosols, inversions, fluxes, heating rates, and absorption are mentioned. (Author abstract modified)

26553 **APTIC NO. 48283**

UNSOLVED MYSTERY: PHOTOCHEMICAL SMOG. (Kokagaku sumoggu, nazo no mama). Text in Japanese. Kankyo Eisei (Environmental Sanitation), 19(2):20-21, Dec. 1972.

As a result of a photochemical smog incident at the Shakujii South Junior High School in Tokyo, traffic was experimentally controlled to see the change in the pollution index. The concentration of carbon monoxide, nitric oxide, and non-methane hydrocarbons decreased to half of the normal amount during the test period, on the roads adjacent to the school. But the indexes stayed at the normal level in the residential area about 100 m away from the roads; furthermore, the concentration of nitrogen dioxide increased during the period the traffic was controlled. High pollution was noted in other adjacent areas for the same period. On the other hand, acrolein concentration was less than 0.005 ppm. The local dispersion patterns were investigated with the use of a balloon and a tracer gas, but besides the limited amount of turbulence on the roof of the school building and at the playground at times of low wind, no particular pattern was pinpointed. Further investigations are necessary for these localized photochemical phenomena.

26554 **APTIC NO. 47862**

Albersheim, Steven R. and John E. Lewis

DISTRIBUTION PATTERNS OF SUSPENDED PARTICULATE MATTER IN PRINCE GEORGES COUNTY, MARYLAND. Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 249-255, 1972. 9 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)

Distribution patterns of suspended particulate matter in Prince Georges County, Maryland were examined as a preliminary investigation for the distribution patterns for the Washington, D. C. metropolitan area. The effects of various meteorological conditions, including wind speed and direction, base height of the morning inversion layer, noon mixing depth, duration of precipitation, and percentage of cloud cover were studied with respect to a spatial analysis of particulates in the county. The study area, emission sources, sampling network, meteorological data, and analytical procedures are defined.

26555 **APTIC NO. 47824**

Atwater, Marshall A.

THERMAL CHANGES INDUCED BY URBANIZATION AND POLLUTANTS. Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 153-158, 1972. 16 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)

A numerical model developed for the study of a wide range of atmospheric processes in the boundary layer was applied to the thermal changes induced by urbanization and pollutants. Equation parameters included the horizontal wind vector, the vertical velocity, an appropriate source term, vertical eddy diffusion, time, and height. The dependent variable accounted for eastward or northward velocity, temperature, humidity, or pollutant (aerosol). Boundary conditions, auxiliary variables, and the finite-difference solutions are specified. The magnitude of the simulated urban heat island was 7-8 C near sunrise and about 1 C in the afternoon. The urban thermal plume started at the central city and extended at elevated levels downwind of the city. Pollution was a relatively minor factor in determining the temperature; its greatest influence was on vertical stability. (Author conclusions modified)

26556 **APTIC NO. 47837**

Beebe, Robert C. and Griffith M. Morgan, Jr.

SYNOPTIC ANALYSIS OF SUMMER RAINFALL PERIODS EXHIBITING URBAN EFFECTS. Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 173-176, 1972. 7 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)

Urban effects on weather and precipitation in St. Louis were extensively studied. Synoptic analysis of the 1971 data suggested urban rainfall enhancement in the warm sectors, ahead of frontal zones, with the major contribution to downwind rainfall from squall and air mass systems. This was corroborated by the mixing depth statistics which defined downwind maximization during periods of high to unlimited mixing depths. Therefore, instability and free mixing, from the lowest levels, of pollutants, heat, and water vapor were important for local rainfall enhancement. (Author summary modified)

26557 **APTIC NO. 47926**

Berlyand, O. S., V. N. Petrov, and D. A. Severov

ON THE PROPAGATION OF POLLUTANTS ON LARGE DISTANCES WHEN VERTICAL DIFFUSIVITY IS A FUNCTION OF TIME AND HEIGHT. (O rasprostranenii primesi na bolshiye rasstoyaniya pri peremennom vo vremeni ili po vysote koeffitsiente vertikalnoy diffuzii). Text in Russian. Izv. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana, 8(9):994-997, Sept. 1972. 6 refs.

Diurnal and seasonal variations of the vertical diffusion coefficient were studied by aircraft measurements of the vertical profile of radioactive inert gas concentrations following underground explosions. The daily variation of the vertical diffusion coefficient was most pronounced during summer, with the minimum in the morning hours, and a maximum of 50 sq m/sec under convective conditions during the afternoon hours. No diurnal variations during the winter and spring periods were observed. The minimum obtained for the winter period was in a range of 5-7 sq m/sec. The averages for the spring, summer, winter, and for the summer convection periods were 12, 16, 10, and 40 sq m/sec, respectively. Changes in the vertical diffusion coefficient caused marked changes in the ground-layer concentrations during the first 2-3 days.

26558 **APTIC NO. 48085**

Blumstein, Alfred, R. Gordon Cassidy, Wilpen L. Gorr, and Anthony S. Walters

OPTIONAL SPECIFICATION OF AIR-POLLUTION-EMISSION REGULATIONS INCLUDING RELIABILITY REQUIREMENTS. Oper. Res., 20(4):752-763, July-Aug. 1972. 22 refs.

A basic model for air pollution control is a semi-infinite program that minimizes the sum of an individual polluter's control costs while ensuring that ambient pollution concentrations are within air quality standards. An extension of the model is discussed that includes the effects of pollution-control-device breakdowns and shutdowns for planned maintenance. Days with good dispersion of pollution emissions occur periodically and can be accurately forecast for shutdown periods. A stochastic process of breakdown arrivals and servicing, and appropriate extensions of diffusion models give rise to a wind rose model for additional concentrations due to downtime. Parameters of the stochastic process are included as decision variables in a chance-constrained semi-infinite program allowing for tradeoffs between collection efficiency and various reliability characteristics. A practical implementation model and solution techniques are given for possible use in the present clean air program. (Author abstract modified)

26559 **APTIC NO. 48124**

Bogen J., M. Sappock, and G. Schumann

MEASUREMENTS OF ATMOSPHERIC RADON-220 USING DELAYED ALPHA-PARTICLE COINCIDENCES. Arch. Meteorol. Geophys. Bioklimatol., Ser. A (Vienna), 21(4):171-182, 1972. 11 refs.

Radon(220) can be measured in the atmosphere and used as a tracer for the study of meteorological parameters in the atmospheric surface layer. To measure atmospheric radon(220) (thoron), a device was developed which uses alpha-alpha coincidences from the decay of radon(220) and its very short-lived decay product polonium(216) (half-life 0.16 sec). The alpha decays are detected in a scintillation chamber of 1340 cu cm effective volume and 2600 sq cm sensitive inner surface. The equipment records all alpha-alpha coincidences with time delays up to 0.32 sec. Atmospheric thoron concentrations were measured at 0.5, 1.0, and 6.0 m above the ground in Manheim and at the station of the Deutsche Forschungs-Gemeinschaft where the important meteorological parameters are recorded regularly. Correlation and regression calculations were carried out for various parameters. The change of radon(220) content with wind speed at various heights was interesting. A maximum was found for a certain wind speed in each altitude. This affects the determination of diffusion coefficients from the ratios of radon(220) concentrations in each of two different heights. (Author summary modified)

26560 **APTIC NO. 47823**

Bower, Carl A., Jr. and Donald L. Shearer

A CASE STUDY OF SURFACE MESOSCALE WIND FLOW DURING A LOW VISIBILITY-VENTILATION EPISODE IN THE SALT LAKE VALLEY. Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 129-134, 1972. 2 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)

Surface mesoscale wind flow was studied during a low visibility- ventilation episode in the Salt Lake Valley. Surface maps were constructed to represent the simultaneous occurrence of winds aloft, surface wind directions, mixing depth, visibility, and pressure. Study area description, algorithm construction, case analysis, selected wind flow analyses, and study results are presented.

26561 **APTIC NO. 47836**

Changnon, Stanley A., Jr.

URBAN EFFECTS ON THUNDERSTORM AND HAILSTORM FREQUENCIES. Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 177-184, 1972. 8 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)

Historical thunder-day and hail-day records for regions in and around eight American cities were used in an extensive climatic investigation to establish the existence of alterations in their frequencies and to identify the causes. Data were analyzed for Chicago, Indianapolis, St. Louis, Cleveland, Washington, D. C., Tulsa, Houston, and New Orleans. The changes at each city, geographical distributions of the areas with increases, periods when increases began, and the possible relationships of the increase to various synoptic conditions and urban factors were analyzed. Selected synoptic-severe weather results for St. Louis are also included. Thunder and hail-day frequency increases were determined in the six largest cities investigated. Statistically significant increases were established in two basically different climatic zones. Increases were greatest in the warm season and the summer. (Author summary modified)

26562 **APTIC NO. 47840**

Changnon, Stanley A., Jr., Richard G. Semonin, and William P. Lowry

RESULTS FROM METROMEX. Preprint, American Meteorological Society Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 191-197, 1972. 18 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)

Metromex is a major field-laboratory program aimed at assessing the effect of a major urban-industrial complex on precipitation. The program goals, instrumentation, research methodology, and the results of 1971-1972 summer operations are reviewed. Raincell analysis of available data indicated a significant effect of the urban area on the intensity, duration, velocity, and area of precipitating cloud. The aerosol concentration materially altered the microphysical structure of the clouds.

26563 **APTIC NO. 47860**

Chopra, K. P. and W. M. Pritchard

URBAN SHOPPING CENTERS AS HEATED ISLANDS. Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 310-317, 1972. 15 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31- Nov. 2, 1972.)

Shopping centers located within urban areas may produce significant heat island effects on a microscale. Two shopping centers in Norfolk were monitored, and air temperature measurements were correlated. Maps of the observed heat islands in terms of isothermal lines are presented, and numerical models are developed to describe the horizontal temperature patterns. The effects on horizontal temperature distribution of sea breezes, gustiness, degree of cloud cover, traffic and urban activity, the day-night difference, and the differences in the local surface features were also studied. Instrumentation, survey procedures, and study results are discussed.

26564 **APTIC NO. 47833**

Clarke, John F. land James T. Peterson

THE EFFECT OF REGIONAL CLIMATE AND LAND USE ON THE NOCTURNAL HEAT ISLAND. Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., P. 147-152, 1972. 12 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)

Some factors determining spatial and seasonal variations of the nocturnal heat island were examined, including urban land use parameters on a local scale and the atmospheres ability to disperse thermal energy. Temperature statistics presented for the metropolitan St. Louis area determined that the spatial pattern of the heat island was largely determined by land use, and the daily variations of the magnitude of the heat island depended on the vertical temperature structure in the adjacent rural environment. The meteorological potential for the nocturnal heat island for the contiguous United States was determined at its highest during the fall season over the Appalachian Mountains. Other areas of high heat island potential are the Pacific northwest and the north central states. (Author summary modified)

26565 **APTIC NO. 47827**

Craig, Charles D. and William P. Lowry

REFLECTIONS ON THE URBAN ALBEDO. Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 159-164, 1972. 13 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)

A tentative model was developed to define the effect of the trapping of solar radiation by the urban geometry on the urban albedo. The model behaved in a realistic manner and indicated that average daily albedo decreases on the order of 20% might be caused by the presence of canyons with height-to-width ratio of 3.0 and street-width to block-width ratio of 0.25. Other things being constant, the net daily input of solar energy, therefore, would be increased by 20%. (Author summary modified)

26566 **APTIC NO. 47894**

Dmokhovskiy, V. I., L. S. Ivlev, and V. A. Ivanov

AIRCRAFT MEASUREMENTS OF THE VERTICAL STRUCTURE OF THE ATMOSPHERIC AEROSOL ACCORDING TO THE COMPLEX ENERGETIC EXPERIMENT PROGRAM. (Samoletnyye izmereniya vertikal noy struktury atmosfernogo aerozolya po programme kompleksnogo energeticheskogo eksperimenta). Text in Russian. Kompleks. Energ. Eksp., no. 276: 103-108, 1972. 5 refs.

The vertical structure of the atmospheric aerosol composed of 0.1 to 4-micron particles in the 300 to 8000-meter layer of the atmosphere was measured by aircraft impactor and photoelectric counter. The vertical aerosol concentration profile measured over the Karakum during the fall showed an exponentially abating concentration with height, with concentrations otherwise 3-5 times higher than over other parts of the USSR. The particle distribution functions obtained for various altitudes are of high stability.

26567 **APTIC NO. 48113**

Dopplick, Thomas G.

RADIATIVE HEATING OF THE GLOBAL ATMOSPHERE. J. Atmospheric Sci., 29(7)::1278-1294, Oct. 1972. 42 refs.

Monthly zonal mean global radiative heating rates were obtained from the surface to 10 mb for all twelve months. Seasonal profiles of the contribution by each constituent (ozone, temperature, humidity, and carbon dioxide), net thermal cooling, and total radiative heating were constructed. Radiation cools the troposphere almost everywhere primarily due to thermal cooling by water vapor, with the cooling at a maximum in the tropics. The tropical stratosphere is heated by radiation due principally to thermal and solar heating by ozone. This total radiative heating extends into the stratosphere mid-latitudes, but higher latitudes exhibit cooling due primarily to thermal cooling by CO2, with more cooling in the warmer hemisphere. (Author abstract modified)

26568 **APTIC NO. 47838**

Eagleman, Joe R., James L. Huckabay, and Wem C. Lin

INADVERTENT MODIFICATIONS OF URBAN ENVIRONMENTS. Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 165-172, 1972. 8 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31- Nov. 2, 1972.)

A statistical climatology study was initiated to investigate possible effects of urban-industrial complexes on precipitation patterns in the Kansas City-Topeka Corridor. Data on precipitation patterns, cloud cover, temperature, humidity, evapotranspiration modifications, and pollution levels, sulfur dioxide and airborne particles were analyzed. Modifications in the climate and weather patterns of the area were determined; data analysis results are presented.

26569 **APTIC NO. 47852**

Eguchi, Yukio, Shintaro Sueta, Kenichi Shimohara, Nobuyasu Shigemori, and Takashi Akiyama

ON METALLIC CONTENTS OF SUSPENDED PARTICULATES IN KITA-KYUSHU CITY. (Kita-Kyushu shi ni okeru fuyu funjin chu no kinzoku seibun ni tsuite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 95. (Nov. 7-9, Paper 50.)

The relationships between suspended particulates and metal concentrations, and between particulates and the wind direction were examined at eight locations in Kita-Kyushu City since August 1970. Especially high correlations were noted between the quantity of suspended particulates and iron and lead. Iron had high correlations with other metals in the order of Pb, mercury, manganese, and copper. High concentration of metals occurred at various measuring locations depending on certain wind directions. At location E, 845 micrograms/cu m was reached when the wind was NNW; at location H, 643 micrograms/cu m when the wind was W; and at location C, 558 micrograms/cu m when the wind was SE. At these locations, lowest concentrations appeared when the winds were SSW, NNW, and SW respectively.

26570 **APTIC NO. 47935**

Endo, R., N. Kamata, T. Oyake, T. Nakajima, H. Shirakawa, H. Goto, and T. Kogo

ON THE EFFECTS OF NITROGEN OXIDES ON OXIDANT MEASUREMENTS. (Oxidant sokutei no oyobosu chisso sankabutsu no eikyo ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):395, Oct. 1972. (Presented at the General Meeting of Japan Society of Public Health, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

A comparison of data was made on oxidant and nitrogen oxides in the winter and summer in Sapporo where there are comparatively fewer ultraviolet rays and high nitrogen oxides concentrations in winter. Measurements were made on the third story of a building, about 1 km west of the center of town. The electric transmission method was used for sulfur oxide measurements, the Saltzman method for nitrogen oxides, and the extinction method using the potassium iodide method for oxidants. In winter, sulfur dioxide, nitrogen dioxide, nitric oxide, and oxidants were high, but low in summer. In winter there were two peaks, one in the morning and another in the afternoon, repeating the same pattern. The afternoon peak lasted longer than the morning one. The NO pollution was extremely high. The pattern of concentration of these pollutants in a day was the same. When oxidants exceeded 5 ppm in one day, oxidants were 25-31% of NO and 19-23% of NO2 + NO. The correlation between oxidants and NO2 + NO was 0.70. With x as a variant, y/x moved within the range of 17-25%. When the oxidants were over 5 ppm, the correlation between NO2 + NO was 17-23% of NO2 + NO, averaging about 20%. Oxidants reached more than 5 ppm most often in 18-24 hr at night, about 60%. Oxidants in the winter in Sapporo are greatly influenced by nitrogen oxides, especially by NO concentration.

26571 **APTIC NO. 47871**

Fukamori, Shingo

LOW LEVEL, LOCAL STRONG WIND UNDER AN INVERSION LAYER OVER TOKYO BAY. (Gyakutenso ka ni hassei shita Tokyo-wan ni okeru teiso no kyofu ni tsuite). Text in Japanese. Kishocho Kenkyu Jiho (Journal of Meteorological Research) (Tokyo), 24(8):345-349, Aug. 1972. 3 refs.

Land and sea breezes were observed from Aug. 9, 1971 for three days. On Aug. 10, local, strong winds with velocities of 22.6 m/sec, 350 m above Ichikawa City, were recorded. Attempts were made to analyze this incident, but no conclusion was reached. Periodical variations were limited to the coastal area; no strong wind was observed at Ichihara City, only 20 km away. Therefore, it is assumed that this local, strong wind was influenced by the distribution of land and sea, or by topography, and that it was connected with gravity wave somehow. Analysis of another local strong wind which was observed at Ichihara City on Aug. 11 will be given in the future, to seek points in common with the strong wind observed at Ichikawa City.

26572 **APTIC NO. 47927**

Goto, Takao

AIR POLLUTION NEAR AN IRONWORKS (I). (DIFFUSION MECHANISM OF DUSTS). (Seitetsujo shuhen no taiki osen (sono I), shuto shite baijin no kakusan ni tsuite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 87. (Nov. 7-9, Paper 42.)

Samplings of settling particles were taken by simple dust jars at eight locations in the areas 400 to 3000 m from the center of an ironwork factory, 5 m or more from the ground where emission sources had no direct effects. Suspended particulates were sampled by low-volume air pumps in combination with 5-micron milipore filters. The particle size distribution from the sintering factory was obtained by the Griffith equation. The dispersion mechanism of settling particles was studied by the Stokes law, and the dispersion patterns were obtained by the Vosanquet's equation. Little relationship was found between the measurements of settling particles and suspended particulates close to the emission sources; farther away, the amount of suspended particulates increased with the decrease of settling particles.

26573 **APTIC NO. 48148**

Horbert, M.

MEASUREMENTS OF EXCHANGE AND EXHALATION IN A FOREST BY USING RADON-220 AS A TRACER. (Austausch- und Exhalations-Messungen in einem Waldgebiet mittels Radon-220 als Tracer). Text in German. Arch. Meteorol. Geophys. Bioklimatol., Ser. A (Vienna), 21(14):211-220, 1972. 9 refs.

Using a mobile station, the vertical distribution of thoron was measured in the atmosphere up to an altitude of 1.8 m. The turbulent mass transport in this region was calculated in a forest and in an open field. An essential requirement was the extensive measurement of the exhalation of both radon and thoron. The mass exchange rose with the wind velocity. It was higher by a factor of five in the open country than in the forest. The main components of the measuring station for the vertical distribution of thoron were four ionization chambers. The sample volume was drawn into a 160 l central cylinder whose sides were formed by perforated copper disks. These disks guaranteed a uniform passage through the chamber. They also served to support the interior electrodes. An external cylinder surrounded the measuring chamber.

26574 **APTIC NO. 48009**

Hoydysh, Walter G.

AERODYNAMICS: NEW DESIGN CRITERIA. Archit. Forum, 137(2):58-61, Sept. 1972.

The topographic effects of urban areas on climate are discussed. Urban areas should be planned with the aerodynamic consequences of buildings, street canyons, and traffic in mind. Architectural competitions often neglect aerodynamics; for example, an architectural competition for the redesign of Skopje, Yugoslavia led to a walled community design which would have effectively stopped any breezes. A wind tunnel test was made of four different models for Skopje's development. The testing led to a new design that opened up the wall somewhat and created channels that would provide for ventilation. High speed computers are effective in analyzing aerodynamic flow. Scale models can be studied in wind tunnel tests to determine the effects of winds, convection, typhoons, automobile exhausts, ventilation, and other factors. Several examples are discussed.

26575 **APTIC NO. 48200**

Ishihara, Soichi

EMISSION CHARACTERISTICS OF 2-CYCLE ENGINE. (2 saikuru kikan no haiki shoseishitsu). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 11(131):138-148, Nov. 1972.

The scavenging system of the two cycle engine greatly influences the emission characteristics of the said engine. In a scavenging system in which new supply of mixture gas expels the already burned mixture gas out of the cylinder as it fills, part of the new supply of mixture gas tends to blow to the exhaust port while some of the already burned mixture gas remains in the cylinder due to incomplete scavenging action. Both the blowby and the remaining exhaust gas are greater compared with a four-cycle engine. The blowby of the new mixture gas causes hydrocarbon emission and fuel waste to increase while the remaining exhaust gas, like an exhaust gas recirculation in a four-cycle engine reduces the nitrogen oxides generation. Combustion in a two-cycle engine is affected not only by the scavenging efficiency but also many other factors such as the combustion chamber design, number, position, direction, and size of the exhaust port, and operating conditions of the engine including the revolution speed and load. It is also affected by the gas vibration caused by the gas speed and pressure variation taking place as the gas flows through the crankcase, scavenging channel, cylinder and exhaust pipe. Engine performance, state of the combustion and composition of the exhaust gas of a two-cycle engine largely depends on the scavenging, which should conversei, be evaluated from the scavenging efficiency plus the combustion and the exhaust gas composition. Using the scavenging-combustion equations, composition of the exhaust gas was estimated. Also discussed are the factors affecting the exhaust gas composition; effects of the excess air ratio, ignition timing, and revolution speed. Various control measures throught to lead to harmless diesel engine emission are listed including exhaust control valve, water injection, and afterburners.

26576 **APTIC NO. 47875**

Ivanova, G. F.

ON THE VERTICAL OZONE DISTRIBUTION IN JET STREAM ZONES. (O vertikal nom raspredelenii ozona v zonakh struynykh techeniy). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 279:167-184, 1972. 10 refs.

Results from 846 ozonesonde observations in jet stream zones over North America are evaluated. Jet streams exert a considerable effect on the ozone partial pressure mean profile perpendicular to the flow axis within 10-18 km altitude. Jet streams produce considerable gradients of the ozone partial pressure, with a mean value of 10-15 nanobar/100 km, from the left to the right side of the stream. The gradient appears at the 10-16 km altitude during the fall, winter, and spring, and at 16-18 km during the summer. The mean value of the gradient is highest with 15 nanobar/100 km during the winter. Positive deviations of the ozone partial pressure in the left-hand part of the stream during winter, spring and especially during fall with a maximum of 15 nanobar, and negative deviations in the right-hand side of the stream with maximum during the spring, were observed. A sharp drop by 1.5-2 km in the height of the tropopause and of the ozonepause from the right to the left side of the stream, especially in the spring and fall, was determined. The ozonepause in the right-hand side of the stream lies either higher than or at the same height as the tropopause, but in the left-hand side it is 0.5-1.0 km lower than the tropopause.

26577 **APTIC NO. 48278**

Junge, C.

THE CYCLE OF A ATMOSPHERIC GASES – NATURAL AND MAN MADE. Quart. J. Roy. Meteorol. Soc. (London), 98(418):711-729, Oct. 1972. 53 refs.

The cycles of natural and man made atmospheric gases and global problems of the troposphere and lower stratosphere are discussed. Atmospheric gases, their average mixing ratios, residence time, and status are listed according to cycles. Cycles include physical and chemical processes, biological and microbiological activities, volcanic exhalations, radioactive decay, and industrial activity. The carbon monoxide cycle includes carbon monoxide, methane, hydrogen, nitrous oxide, carbon dioxide, and ozone. These gases are described and compared. Gases contributing to atmospheric aerosol formation in the sulfur cycle, including sulfate, ammonium, nitrate, chloride, and sodium, are reviewed. The oxidation of sulfur dioxide, photochemical reactions, precipitation, and absorption of SO2 by the Earth are mentioned. Criteria for a genetic order of atmospheric gases are presented. The role of the biosphere in atmospheric composition is discussed.

26578 **APTIC NO. 48077**

Kyan, C. P. and J. H. Seinfeld

DETERMINATION OF OPTIMAL MULTIYEAR AIR POLLUTION CONTROL POLICIES. Trans. ASME (Am. Soc. Mech. Engrs.), 94(3):266-274, Sept. 1972. 23 refs.

A general theoretical framework for the determination of multiyear air pollution control strategies for an airshed is presented. It is assumed that emission control procedures are changed on a year-to-year basis. A set of control measures that minimizes the total cost of control while maintaining specified levels of air quality each year is needed. It is assumed that an airshed model exists which is capable of predicting pollutant concentrations as a function of source emissions in the airshed. The general multiyear problem can be solved by discrete dynamic programming. The method is illustrated for the problem of determining control strategies for carbon monoxide for a 3-year period in the Los Angeles basin. (Author abstract modified)

26579 **APTIC NO. 48074**

Lahmann, Erdwin and Karl-Ernst Prescher

SULFUR DIOXIDE EMISSION IN THE VICINITY OF POWER PLANTS. (Schwefeldioxid-Immissionen in der Umgebung von Kraftwerken). Text in German. Staub, Reinhaltung Luft, 32(10):390-392, Oct. 1972. 3 refs.

Sulfur dioxide was measured continuously at five measuring stations in Berlin over a half year. Wind direction and wind speed effects were studied. Flue gases from four power stations influenced the average and peak SO2 concentrations; the absolute amount of this influence was low. There was a good correlation between the data from the measuring stations, especially during periods of low wind speed. At all stations the highest average SO2 emissions and the highest 95% sum frequencies occurred at east and southeast winds. This can be explained by the fact that to the east and southeast of the measuring stations is the largest section of the city of Berlin. In this direction power plants are located. Eastern winds prevail in the winter during which the season emissions from domestic heating systems must be added. Southeast winds are related to a low wind velocity. The average SO2 concentrations measured at the five stations ranged from 0.15 to 0.18 mg/cu m air for all wind directions; the 95% value of the sum frequency was between 0.47 and 0.50 mg/cu m.

26580 **APTIC NO. 47822**

Lowry, William P.

URBAN EFFECTS ON THE ATMOSPHERE -- WHO IN THE WORLD CARES? Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 135-138, 1972. 11 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)

The urban effect on the environment is described and defined in a general context. Typical climatic changes due to urbanization include changes in temperature, relative humidity, dust particle concentration, cloudiness, radiation, wind speed, and precipitation. The place of urban climatology within the spectrum of world problems is considered, and tentative proposals are presented for research and study in the field.

26581 **APTIC NO. 48109**

Mazzarella, Daniel A.

AN INVENTORY OF SPECIFICATIONS FOR WIND MEASURING INSTRUMENTS. Bull. Am. Meteorol. Soc., 53(9):860-871, Sept. 1972. 48 refs. (Presented at the American Meteorological Society, Symposium on Meteorological Observations and Instrumentation, San Diego, Calif., March 27-30, 1972.)

Significant developments in the measurement of wind are reviewed, and performance specifications of commercial instruments for measuring wind direction, wind speed, and atmospheric turbulence are summarized. The specifications cover damping ratio, delay distance, damped and undamped natural wavelength, maximum overshoot with sinusoidal fluctuations, starting threshold, range, and accuracy. The instruments include both pressure tube anemometers and rotary type anemometers. The dynamic requirements of wind instruments used in air pollution studies are noted.

26582 **APTIC NO. 47835**

McElroy, James L.

EFFECTS OF ALTERNATE LAND-USE STRATEGIES ON THE STRUCTURE OF THE NOCTURNAL URBAN BOUNDARY LAYER. Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 185-190, 1972. 6 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)

Simulations for a hypothetical symmetrical city were compared with those for other hypothetical cities with the same major land-use areas but with the areas arranged in different patterns or with additional land-use areas placed within or between the major land-use areas. Simulations were made of megalopolises, each consisting of several of the symmetrical hypothetical cities linked together to determine the effects of alternate land-use strategies on the structure of the nocturnal urban boundary layer. The model parameters included wind components, specific humidity, atmospheric and surface temperature, local stability, and aerodynamic surface roughness. Data analysis and study results are reviewed.

26583 **APTIC NO. 48008**

Miller, P. R., M. H. McCutchan, and H. P. Milligan

OXIDANT AIR POLLUTION IN THE CENTRAL VALLEY, SIERRA NEVADA FOOTHILLS, AND MINERAL KING VALLEY OF CALIFORNIA. Atmos. Environ., 6(9):623-633, Sept. 1972. 8 refs.

Total oxidant air pollution, temperatures, and winds were measured in the Central Valley, the Sierra Nevada foothills, and the Mineral King Valley from Aug. 17-27, 1970. Vertical profiles of total oxidant and temperature were determined by aircraft (at Fresno, Visalia, Three Rivers, and Mineral King) several times daily during a 2-day period. Evidence was recorded of the transport of photochemical smog from the Central Valley to Mineral King. In situ formation of oxidant and diurnal changes in the temperature profile in Mineral King Valley were observed. The primary pollutants (nitrogen oxides and hydrocarbons) necessary for the early morning formation of ozone in Mineral King Valley were probably advected from the foothill or Central Valley area the previous afternoon. More abundant ultraviolet light at the higher elevations may be a significant factor for increasing the rate of ozone accumulation, particularly during morning hours. Mineral King Valley developed a shallow and persistent temperature inversion which became barely isothermal in the late afternoon. The limited ventilation of the valley under this thermal structure may be responsible for the observed buildup of oxidant during the morning hours. (Author abstract modified)

26584 **APTIC NO. 48257**

Nishida, K., T. Ohashi, T. Yamamoto, and T. Arai

AIR DUCT EXPERIMENTS CONCERNING DIFFUSION OF EXHAUST. (Jidosha haishutsu gasu no kakusan ni kansuru fudo jikkan). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):376, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

In order to establish a method of estimation of the concentration of exhausts in streets surrounded by buildings, an air duct experiment was conducted. Model street space was simulated in an air duct centered on a rotating board, 2.4 m in diameter, in order to change a pollution point source into plane source pollution. Tracer gas diffusion was tested using two street models with two and four buildings each. By rotating the circular board, wind direction could be altered. The widths of road were 200, 300, 400, and 600 mm, and heights of the model buildings were 200 and 400 mm. Wind velocity was 0.8 m/sec; and ethane gas was used as the tracer gas. The actual carbon monoxide gas concentration was measured 2 days each in summer and winter on a busy road in Osaka, to compare with experimental results. A formula could be worked out from the experiments, which indicated the actual CO concentration measured on the street. Air duct experiments results were in a linear relationship with field results.

26585 **APTIC NO. 47826**

Norwine, James R.

HEAT ISLAND PROPERTIES OF AN ENCLOSED MULTI-LEVEL SUBURBAN SHOPPING CENTER. Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 139-143, 1972. 19 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)

The surface temperature patterns of a large contiguous suburban shopping center were analyzed over an extended winter period to ascertain the existence and nature of the heat island phenomenon. Study site, measurement methodology, and results are reviewed. The heat island, with a mean value of about 1 F, appeared clearly in all three test months and for the entire period of record. However, the degree of development was relatively small, possibly due to the structure of the shopping center. The effects of topography, weather air temperature, wind speed, cloud cover, and directional location were also studied; only meteorological effects were important. The combined mean temperature was almost exactly between that of the rural and the suburban control stations.

26586 **APTIC NO. 47999**

Ohtake, T. and K. O. L. F. Jayaweera

ICE CRYSTAL DISPLAYS FROM POWER PLANTS. Weather (London), 27(7):271-277, July 1972. 7 refs.

The power plants in Fairbanks, Alaska which supply the large quantities of power needed for heating the city emit large quantities of water vapor into the atmosphere. Because of temperature inversions in the winter, the water vapor condenses at temperatures below -35 C into an ice fog in the lowest layers of the atmosphere. At temperatures between -15 C and -35 C and humidities in excess of ice saturation, power plant plumes cause condensation of ice crystals which have well-defined crystal faces and which give rise to various optical effects such as sun-pillars and halos. The concentration of ice crystals is far higher than that expected from the ice nucleus concentration. Samples of ice crystals were collected and ice crystal displays were observed all over Fairbanks on Nov. 2, 1971. All the ice crystals were stellar or dendritic, with broad branches. Ice crystal concentrations under plumes were more than 10/l; in remote places they were 0.1/l. The mechanisms of condensation and freezing of water vapor from power plant plumes are different from those of natural clouds. In power plant smoke, the water-saturated air at a temperature near 100 C is brought into contact with the environmental air at subzero (e.g., -15 C) temperatures which gives rise to very high supersaturations in the initial stages of cooling. Therefore, condensation takes place on almost all the available nuclei in the plume including combustion by-products. In a natural cloud, the relatively low supersaturations would have kept some of the nuclei in a dry state. Therefore, the difference in ice crystal concentrations under the plume and ice nuclei measured could have resulted from the increased effectiveness of the condensation-freezing process over that of the sorption process of the nuclei from combustion by-products.

26587 **APTIC NO. 48286**

Oka, Michio, Shigeo Yamaoka, Masanori Fukuda, and Osamu Fukase

SULFURIC ACID MIST IN URBAN AIR. (Toshi taiki chu no ryusan misuto). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 272. (Nov. 7-9.)

The geographical characteristics of air pollution in two districts of Osaka were examined, and the mutual reactions between dusts and sulfur dioxide, and the catalytic reaction of SO2 to metals were measured. Samples were taken simultaneously for 24 hours in industrial and a commercial districts using high-volume samplers with glass fiber filter paper. The sulfuric acid mist analysis was conducted by the Commins method. The catalytic reaction was examined using a dust-SO2 reactor, and after a given time, analyzed by the Commins method. There was no areal difference in the two districts between September and December. The conversion of SO2 to sulfuric trioxide was controlled by the temperature and absolute humidity. However, no definite reaction to humidity was proven in lab tests. The data from the continuous monitoring of these districts showed no geographical characteristics. More data on health examinations in these areas, pollution conditions, and particle size distribution are necessary in order to grasp areal characteristics.

26588 **APTIC NO. 47825**

Oke, T. R.

CITY SIZE AND THE URBAN HEAT ISLAND. Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 144-146, 1972. 13 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)

The urban heat island was measured for a range of settlement sizes with an experimental design which kept the influences of topography, adjacence to water bodies, regional climate, time, and instrumentation as constant. Air temperatures were measured with an instrumented automobile which traversed through 10 different settlements located on a flat plain; therefore, the only major factors determining heat island size were the nature of the settlements and the prevailing meteorological controls. An underlying relation between city size and heat island intensity was determined. The relation is not precise, but its form is recognizable.

26589 **APTIC NO. 47872**

Okita, Toshikazu

PHYSICO-CHEMICAL CONVERSION OF ATMOSPHERIC POLLUTANTS. (Taiki osen butsu no butsuri kagaku teki hensen). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(5):12-20, Oct. 1972.

Photochemical conversion of nitrogen compounds, the formation of sulfuric acid mist from sulfur oxides, and photochemical reactions of carbon monoxide and other pollutants are reviewed. Sources amounts formed, transport, photochemical reaction mechanisms of nitrogen oxides with hydrocarbons, the effect of HC on the formation of nitrogen dioxide, and reactions of sulfur dioxide with HC are mentioned. The relationship between the SO2 oxidation rate and atmospheric humidity is outlined. The behavior of these pollutants is stoichiometrically explained in connection with photochemical smog in Japan, America, and other countries. Experimental results of NOx oxidation and eye irritation from nitric oxide and NO2 are discussed. In the stratosphere, the lower layer is rich in ozone, but in the upper layer oxygen and hydrogen ions predominate. Nitric oxide reacts with O3 to form NOx which changes to nitric acid. Sulfur compounds and hydrogen sulfide also reach the stratosphere from the Earth s surface and are oxidized on their way.

26590 **APTIC NO. 48142**

Pagliari, Marcello

THE RISE OF SMOKE PLUMES UNDER CALM AND STABLE ATMOSPHERIC CONDITIONS. (Sull innalzamento di pennacchi di fumo in atmosfera calm e stabile). Text in Italian. Riv. Meteorol. Aeronaut., 32(3):235-241, July/Sept. 1972. 8 refs.

An equation was derived for the rise of hot effluents above the stack orifice under a prevailing moderate or strong wind. The equation does not contain a parameter representing atmospheric stability because temperature distribution approaches the adiabatic gradient and the behavior of the atmosphere can be sufficiently represented by a constant. However, in a calm atmosphere or a mild breeze, the effect of a stable stratification cannot be overlooked. By reasoning developed by Scorer, a formula is derived in which the median temperature of the effluent is a function of the height above the stack orifice and of the quantity of heat emitted in a unit of time. If temperature distribution in the atmosphere is known, then the rise of a smoke plume can be calculated or arrived at graphically on the basis of the emission characteristics at the orifice. An atmospheric temperature inversion will block the use of any smoke plume, while in the infrequent instances of an adiabatic gradient combined with a calm, effluents can rise all the way to the clouds.

26591 **APTIC NO. 48000**

Pittock, A. B.

HOW IMPORTANT ARE CLIMATIC CHANGES? Weather (London), 27(7):262-271, July 1972. 28 refs.

Carbon dioxide and dust increases in the atmosphere can possibly decrease the mean surface temperature. Since the amplitude of the fluctuation in the annual mean northern hemispheric surface temperature over the last 100 years was 0.6 deg C, climatic changes of 0.5 deg C due to global atmospheric pollution over the next few decades are unlikely to lead to a new glacial era. However, camparable climatic fluctuations in the past have resulted in serious alterations in the lengths of growing seasons and in the limits of agricultural and sea ice in marginal areas. Temperature fluctuations have also been associated with changes in atmospheric circulation, rainfall, and associated pressure patterns. Shifts in climatic trends can affect the long-term structure of plant and animal communities and thus the ecology and economy of affected areas. Rivers, water tables, water supplies, and irrigation can be affected by an increase or decrease in precipitation. While in the long run, small climatic changes would cause both beneficial and adverse effects which would balance, during the period of adjustment the beneficial and adverse effects are unlikely to balance out.

26592 **APTIC NO. 47859**

Pritchard, W. M. and K. P. Chopra

EFFECT OF AIR POLLUTION ON URBAN VISIBILITY STATISTICS. Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 241-248, 1972. 7 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)

The effect of air pollution, especially particulate matter, on urban visibility statistics was investigated from data on visibility in Norfolk, Virginia, during 1960-1970. Three statistical indices were computed for each set of yearly visibility data; only the mean annual visibility parameter gave an indication of decreasing visibility. The dispersion indices and the standard deviation and skewness showed no particular trend. On this basis, the frequency of occurrence of low visibilities would be the most sensitive measure of the effect of air pollutants on visibility. Data on relative humidity, average precipitation, and winds were also correlated with visibility measurements. Seasonal correlations were computed.

26593 **APTIC NO. 48076**

Rodhe, Henning, Christer Persson, and Ove Akesson

AN INVESTIGATION INTO REGIONAL TRANSPORT OF SOOT AND SULFATE AEROSOLS. Atmos. Environ., 6(9):675-693, Sept. 1972. 20 refs.

Soot and sulfate aerosols were measured daily at urban and nonurban locations in southern Sweden to demonstrate that an appreciable long range transport of these substances takes place from source regions in the southeast-southwest direction. A comparison with anthropogenic emissions showed that distant sources -- more than 1000 km away -- gave significant contributions. The contribution of sea spray to sulfate values was measured at coastal stations. Measurements at coastal stations and towns were compared -- sulfate concentrations were only 50% higher in towns than in coastal stations and the variations from one month to another was rather similar; also, soot values were four times higher in towns than coastal stations, and the variations of monthly values were similar and similar to variations of sulfate. The rate of formation of sulfate aerosols from the oxidation of sulfur dioxide was studied. As a mean value for Swedish towns, only about 5% of the emitted sulfur was oxidized and formed sulfate aerosols within the first tens of minutes that the air parcel was within the town. The total aerosol concentration was estimated from visibility observations. A clear correlation between the sulfate concentration and the total aerosol mass was found, although the mass of sulfate ions was only a small fraction of the total aerosol mass. The influences of wind, transport direction, and precipitation were also studied. (Author abstract modified)

26594 **APTIC NO. 47949**

Roedel, W.

SPALLATION PRODUCTS OF COSMIC RADIATION IN THE STUDY OF THE ATMOSPHERE. (Spallationsprodukte der kosmischen Strahlung bei Untersuchungen in der Atmosphaere). Text in German. Naturwissenschaften (Berlin), 59(10):456-463, 1972. 51 refs.

A radioactive sodium (24) nuclide can be used for a study of the diffusion in the lower layers of the atmosphere. For verification of this, a simple vertical diffusion model was tested. The model was based on the assumption that the nuclide concentration is determined solely by the equilibrium between production, radioactive decay and the on and off-transport by turbulent diffusion. The specific activity of the tracer nuclide in various altitudes above sea level is a function of the vertical turbulent diffusion coefficient. Within the vertical diffusion coefficient. within the vertical diffusion coefficient from 10,000 and to 10,000,000 sq cm/sec and up to about 4 km, the nuclide concentration is remarkably dependent on the diffusion intensity represented by the vertical diffusion coefficient. Thus from the Na(24) concentration, the vertical diffusion coefficient can be calculated. The spallation product Na(22) was used for the determination of the average residence time of aerosols in the various sections of the stratosphere. A model similar to the determination of the vertical diffusion coefficient was developed. For a geographical latitude of 0 to 30 deg North, an aerosol residence time of 20 months was found for the altitude of 18 to 20 km. Also, a method was developed for drawing conclusions for processes in higher layers of the atmosphere from Na(22) measurements on the ground. Quantitative information on the diffusion of the nuclide between stratosphere and troposphere was obtained. The deposition of the nuclide on the ground proved to be the most influencing factor of this diffusion.

26595 **APTIC NO. 48110**

Sartor, J. Doyne

CLOUDS AND PRECIPITATION. Phys. Today, 25(10):32-38, Oct. 1972. 17 refs.

Theoretical studies of the physics of cloud formation and flights made by an instrumented sailplane in 1971 and 1972 are described. Relatively little is known about the growth of particles by coalescence and accretion, but theoretical calculations of growth by collision are considered very good. Droplet size distributions in summer cumulus, mountain lee-wave clouds, and cloud-free atmospheres in Colorado were measured by a probe on the instrumented sail plane. In situ photographs of cloud droplets and occasional coexisting ice forms were also obtained. The data obtained in these field experiments usually contained the integrated result of several physical processes. Processes such as collision and coalescence among cloud droplets or the accretion of small-cloud droplets by larger drops and ice particles sometimes happened too quickly or on scales too small to be observed directly. Further theoretical and laboratory studies are indicated.

26596 **APTIC NO. 48154**

Stampfer, J. F., Jr.

AN AIRCRAFT, AEROSOL SAMPLING PROGRAM: SOME PRELIMINARY RESULTS. Atmos. Environ., 6(10):743-757, Oct. 1972. 22 refs.

An aircraft sampling program was developed to determine the vertical and size distributions of that part of the atmospheric aerosol with radius greater than 0.25 micron. A single engine aircraft and a light scattering particle analyzer were used in the study. The normal size distribution, effect of lapse rate on the vertical aerosol concentration gradient, effect of relative humidity and temperature on the size distribution, and the possibility of producing high concentrations of giant particles aloft were investigated. Experimental apparatus and procedures, data collection and analysis, and test results are reviewed. (Author abstract modified)

26597 **APTIC NO. 48203**

Unsworth, M. H. and J. L. Monteith

AEROSOL AND SOLAR RADIATION IN BRITAIN. Quart. J. Roy. Meteorol. Soc. (London), 98(48):778-797, Oct. 1972. 35 refs.

The irradiance of the solar beam was measured on cloudless days at specified points in England and Scotland. Total and diffuse fluxes were also measured. An attenuation coefficient for aerosol (tau a) was defined by relating the measured flux at normal incidence to the flux calculated for a dust-free atmosphere when the air mass number is m. Daily changes of tau a were related to changes of air mass origin; local sources of aerosol were relatively unimportant. In maritime air, tau a ranged within 0.05-0.15, and in continental air, within 0.1-0.5. In a tropical maritime air mass, tau a decreased from 0.13 at sea level to 0.07 at 1340 m. The fraction of ultraviolet plus visible to total radiation was (0.54 0.28 tau a), and the ratio of diffuse to total radiation at m less than 2 was (0.1 + 0.7 tau a). The ratio of total scattering to absorption by aerosol decreased from 4 (at m equals 1.1) to 0.5(at m equals 2). Mean monthly values of tau a were calculated from records of solar radiation and hours of sunshine, and corresponding values of total and diffuse flux were tabulated for isolated, rural, and urban areas. (Author summary modified)

26598 **APTIC NO. 48326**

Wilson, William E., Jr., D. F. Miller, D. R. Hopper, and Arthur Levy

PILOT STUDY -- INTERACTIONS OF SO2 IN NEW YORK CITY AIR. (FINAL REPORT). Battelle Memorial Inst., Columbus, Ohio, Columbus Labs., American Petroleum Inst. Proj. S-11, Pub. 4105, 22p., Feb. 1, 1972. 11 refs.

The feasibility of an extensive study of the interaction of sulfur dioxide and ozone in a real urban atmosphere was determined using data on air quality in New York City and results of laboratory experimental smog chamber experiments. The only major controls were the level of SO2 added to the air and the conduct of smog reaction in the chamber. While the experimental technique exaggerated the oxidant-forming potential, it provided a useful means for measuring smog effects in urban atmospheres. The production of oxidant was relatively unaffected by the presence of SO2. The experimental techniques, analytical methods, weather conditions, and data on concentrations of SO2, selected hydrocarbons, and nitrogen oxides, relative humidity, and temperature are examined. (Author summary modified)

26599 **APTIC NO. 47990**

Yoshikawa, Hiroshi, Katsuto Yamaguchi, and Hirohisa Saegusa

GAS REMAINING IN HORIZONTAL CAVITY (I). (Chokkaku kyabiti nai no gasu no tairyu). Text in Japanese. Kuki Chowa Eisei Kogaku (J. Japan Soc. Heating, Air Conditioning Sanitary Engrs.) 46(10): 901-908, Oct. 1972. 4 refs.

Characteristics of gas remaining in a cavity were experimentally studied with a horizontal cavity simulating the space between high buildings. The experiment was conducted under simplified conditions in which gas was jetted out from the bottom of the cavity and air flowed over the cavity. The average density of gas remaining in the cavity was taken as the index. The effects of the shape of the cavity, the wind velocity above, the jet-out velocity of gas, and the density of gas were examined to derive some empirical formulas. A preliminary observation revealed that density distribution of gas in the cavity forms two zones, the completely mixed zone and the incompletely mixed zone, depending on the variable factors mentioned above. No completely mixed zone was formed in a back step cavity. In both the horizontal cavity and forward step cavity in the mixed zone, the average density was proportionate to Vg/U, where Vg is the gas jet-out velocity in m/sec and U is average wind velocity (m/sec) in a wind tunnel. The average density remains unchanged even if H is changed when H/B is equal to or smaller than 1.5, where H is depth of cavity in meters and B is width of the cavity (m). Where H/B is larger than 1.5, the average density is higher with higher value of H. Differences in the average density between different kinds of gases are affected in proportion to the air/gas density ratio. The incompletely mixed zone was also analyzed in the similar manner.

26600 **APTIC NO. 47921**

Yurganov, L. N. and V. I. Dianov-Klokov

ON THE SEASONAL VARIATIONS OF THE CARBON MONOXIDE CONTENT IN THE ATMOSPHERE. (O sezonnykh variatsiyakh soderzhaniya okisi ugleroda v atmosfere). Text in Russian. Izv. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana, 8(9):981-984, Sept. 1972. 11 refs.

Diurnal and seasonal variations in the atmospheric background carbon monoxide content were determined by absorption spectroscopy. The diurnal fluctuations were within a range of + or 10-30%. The seasonal variation shows an increase in the atmospheric CO content during mid-May with a subsequent maximum of +50-60% during early June, and fairly stable CO levels until the end of the measurements in late July. The seasonal increase in the CO concentration is due to intensified vegetation growth during the May-June period, as the influence of exhaust CO from Moscow, at a distance of 60 km from the site of the measurements, was negligible.

1971

26601 **APTIC NO. 47947**

Baykov, B. K., R. S. Gil denskiol d, I. M. Zrazhevskiy, R. I. Onikul, and G. A. Panfilova

COMPUTATION OF ATMOSPHERIC POLLUTANT DIFFUSION, TESTED THROUGH DATA OBTAINED FROM STUDIES PERFORMED AT A SYNTHETIC FIBER MANUFACTURING PLANT. (Proverka metodiki rascheta rasseyivaniya v atmosfere kholodynkh vybrosov na materialakh obsledovaniya predpriyatiy iskusstvennogo volokna). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 254:72-81, 1971. 5 refs.

Results of carbon disulfide and hydrogen sulfide concentration measurements performed around synthetic fiber manufacturing plants are compared to corresponding values computed by means of a generalized method based on the diffusion theory. The results from experimental measurements and computations, also such based on the specific technological balance of

CS2 and HS2 with respect to the efficiency of available gas cleaning equipment, and to the specific discharge conditions, show satisfactory agreement, particularly for CS2 emissions. Emissions from low sources had considerable contribution to the total concentration up to relatively great distances. The concentration distribution at distances larger than 1-2 km from the center of the industrial complex was practically uniform. It was possible to calculate the concentrations for the weighed mean value of the critical wind speed. The wind speed-dependence of the concentrations was strongest within the plant premises, and fairly weak at a 2-kilometer according to both computation and measurements alike. The pollution level was particularly high and stabile under convective weather conditions in summer, while turbulent diffusion conditions as occur during winter and spring represented minor pollution hazards.

26602 **APTIC NO. 48360**

Beran, D. W., R. B. Chadwick, M. T. Decker, F. F. Hall, C. G. Little, R. G. Strauch, G. D. Thayer, B. D. Warner, J. W. Wescott, F. R. Westwater, and B. C. Willmarth

POTENTIAL CAPABILITIES OF FOUR LOWER ATMOSPHERE REMOTE SENSING TECHNIQUES. National Oceanic and Atmospheric Administration, Boulder, Colo., Wave Propagation Lab., TR-ERL-227-WPL 20, 131p., Dec. 1971. 72 refs.

GPO

The present and potential capabilities of four remote sensing techniques for the measurement of meteorological variables in the lower atmosphere, primarily the troposphere, were evaluated. The four techniques were acoustic echo sounding, FM-CW radar, lidar, and microwave radiometry. The meteorological variables include wind velocity, temperature, humidity, density, and refractive index. No one technique was capable of measuring all six variables under all conditions of weather and visibility. A comprehensive remote sensing program would, therefore, require a combination of multi-frequency backscatter acoustic radars for monitoring vertical humidity profiles, Doppler lidar for measuring temperature and/or wind velocity, polarized bistatic lidar for measuring air density and temperature, and steerable FM-CW radar.

26603 **APTIC NO. 48174**

Berlyand, M. Ye. and R. I. Onikul

EMISSION OF INDUSTRIAL POLLUTANTS INTO THE ATMOSPHERE: A CONTRIBUTION TO THE GENERALIZATION OF THE DIFFUSION THEORY. (K obobshcheniyu teorii rasseyivaniya promyshlennykh vybrosov v atmosferu). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 254:3-38, 1971. 34 refs.

The general diffusion theory was extended for the calculation of the diffusion of cold and heavy polydisperse industrial emissions, and of emission from multiple sources. The ground-level pollutant concentrations originating from cold emissions from high sources were calculated by a dimensionless coefficient whose value is dependent on the wind speed. Wind speeds under 0.5 m/sec were taken for 0.5 m/sec. The calculation was possible even for zero temperature difference between the emission and the atmosphere. The diffusion of heavy polydisperse pollutants was determined by a dimensionless coefficient describing the effect of the gravitational sedimentation under turbulent diffusion conditions. The concentration field created by a multiplicity of sources with different critical wind speeds was determined as a background concentration, and the maximum ground-level concentration occurred at a wind speed equaling nearly the weighed mean value of the different critical wind speeds. Comprehensive tests proved the suitability of the above calculation methods for cold, heavy polydisperse and multiple emissions even from very high stacks, indicating good agreement between theory and experiment. Reducing the number of stacks results in some decrease in the ground-level pollutant concentration, particularly in the case of cold emissions. Increasing the stack diameter has a similar effect. The groundlevel maximum concentration is chiefly determined by the stack height, whose effect is much stronger in the case of warm than in the case of cold emissions. When the use of a single stack is not feasible or desirable, the distance between two individual stacks should not exceed 0.5-1.0 of the stack height, or multiple-duct stacks should be used.

26604 **APTIC NO. 48388**

Mitchell, J. Murray, Jr.

SUMMARY OF THE PROBLEM OF AIR POLLUTION EFFECTS ON THE CLIMATE. In: Man's Impact on the Climate. William H. Matthews, William W. Kellogg, and G. D. Robinson (eds.), Cambridge, MIT Press, 1971, Chapt. 8, p. 167-175. 11 refs. (Presented at the American Geophysical Union, Symposium on Environmental Challenge, Washington, D. C., April 22, 1970.)

Cities--which represent the most concentrated form of environmental modification by man--differ appreciably from rural areas as to local climatic conditions. Urban climatic anomalies extend to temperature, humidity, cloudiness, visibility, radiation, wind speed, and precipitation. The typical direction and magnitude of such anomalies in an average large city is indicated. Those pollutants thought to have significant effects on climate include water vapor, carbon dioxide, combustion products, and possibly nitrogen dioxide. Urban heat islands are mentioned. The basic effects of airborne particulate materials are to scatter and absorb solar radiation, to deplete solar radiation reaching the urban surface, and to reduce visibility through the atmosphere. The efficacy of urban pollutants in modifying precipitation is reviewed. Effects of pollutants on global climate are also considered, and, in particular, on temperature fluctuations and the atmospheric heat budget. Carbon dioxide and particulates are of special concern with regard to global effects. Cloud nucleating effects are also mentioned. Volcanic eruptions since 1855 are tabulated.

26605 **APTIC NO. 48263**

Ogneva, T. A. and L. I. Kuznetsova

CHARACTERIZATION OF GROUND TEMPERATURE INVERSIONS OCCURRING IN THE 0.5-2.0 M ATMOSPHERIC LAYER. (Kharakteristika prizemnykh inversiy temperatury vozdukha v sloye 0.5-2 m). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 254:104-115, 1971. 2 refs.

Temperature inversion frequencies in the lower 0.5-2.0 m layer of the atmosphere were determined from systematic gradient measurements conducted over five to seven summer and three winter periods at 29 observation stations in the USSR territory. Temperature measurements were performed six times during the summer and twice during the winter. The number of inversion periods, averaged for three years, showed small variations with 5-10%. The frequency of temperature inversions was highest with 40-50% (70-80% in summer, and 30-40% in winter) in the night, while the frequency of daytime inversions, occurring only in winter, varied as a function of the orographic conditions, with a minimum of 10-15% in valleys. The diurnal variation of the inversion frequency in summer showed high values in the evening and in the morning, with maximum during the night and minimum during daytime. Increased inversion frequency in spring and fall was observed. The frequency of nighttime inversions with temperature differences larger than 0.5 C was highest in summer and lowest in winter, and it was also low in dry areas where, on the other hand, the fluctuations were considerable. The air temperature had no influence on the probability of inversions. The wind speed had, however, pronounced effect on the formation of inversions. More than 50% of all nighttime inversions in the summer period occurred at wind speeds less than 2 m/sec. The inversion frequency for wind speeds higher than 4 m/sec was 10-15%, maximum, particularly in dry areas, and the frequency of inversions at wind speeds above 2 m/sec in the winter period had an increasing tendency. The inversion frequency in cloudy weather, usually less than 10%, increased during afternoon hours, and in the winter period. Temperature drops of -0.5 to -2.5 C, increasing with the intensity of the inversion, were necessary for the formation of inversions.

26606 **APTIC NO. 48383**

Scorer, R. S.

THE INTERACTION OF LOCAL WEATHER AND AIR POLLUTION PROBLEMS. Int. J. Environ. Studies, vol. 1:259-265, 1971. 2 refs.

Air polluton is best controlled where there exists a common objective among people in responsible positions in a district. It must not be assumed, however, that every district, still less every country, should have the same objective, except in the very general direction of clean air. Scientists must not work too remotely from the crude phenomena of air pollution or disproportionate effort will be applied in useless directions. It is necessary to arrange priorities so that the earliest and largest effort is placed where it will be the most beneficial. Priorities vary according to the local weather, and according to the location and nature of the local pollution sources. Average weather conditions are often meaningless in this context, and local conditions affect the results on various scales, namely architectural, urban, in valleys and mountains, height of cloud base, and according to the efficacy of the scavenging mechanisms. Certain sources may create quite new problems in special climates and local conditions may exert an overriding effect on the planning of surveys. Modeling is considered to be of little value compared with field observations. (Author abstract modified)

26607 **APTIC NO. 48306**

Vdovin, B. I., I. M. Zrazhevskiy, T. A. Kuz mina, R. I. Onikul, A. A. Pavlenko, G. A. Panfilova, G. P. Rastogruyeva, and B. V. Rikhter

VISCOSE FILAMENT MANUFACTURING PLANT EMISSIONS: EXPERIMENTAL ATMOSPHERIC DIFFUSION STUDIES. (Eksperimental nyye issledovaniya rasseyivaniya v atmosfere kholodnykh ventilyatsionnykh vybrosov predpriyatiy viskoznogo volokna). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 254:57-71, 1971. 13 refs.

Experimental studies were carried out on the atmospheric dispersion of cold ventilatory emissions of carbon disulfide and hydrogen sulfide at three different synthetic fiber manufacturing plants. Samplings of 20-30 minute duration were conducted at different distances between 0.5 and 15 km; soil and air temperature, humidity, wind speed and direction, precipitation, pressure, and other meteorological conditions were recorded. The distribution of the two different components in samples taken under different meteorological conditions was fairly uniform. The emissions measured during one day and those calculated from the specific technological balance with respect to the efficiency of the purification equipment showed good agreement. Air masses with the highest CS2 and H2S contents are best discharged through central high stacks to take best advantage of both natural dispersion and available purification equipment. Large volumes of air with smaller pollutant concentrations should be also discharged through such stacks since they result in increased discharge rates at the top of the stack. The ratio of CS2 and H2S emissions from high and low sources was largely dependent on the degree of hermetization of the technological equipment. It was possible to purify or discharge through high stacks 60% of the total CS2 emission. The proportion of CS2 emitted from low sources was 12-15%, and some 15% of the initial CS2 emission formed H2S prior to discharge. The H2S emissions from low sources can be reduced to 4-5% of the total emission by applying all available technical possibilities. A purifying equipment used at one of the plants had an efficiency of 80-85% for H2S and 14-20% for CS2.

26608 **APTIC NO. 48307**

Zaytsev, A. S.

WIND DIRECTION PULSATIONS OCCURRING IN A BOUNDARY LAYER OF THE ATMOSPHERE. (Pul satsii napravleniya vetra v pogranichnom sloye atmosfery). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 254:100-103, 1971. 7 refs.

Wind direction pulsations occurring in the ground layer of the atmosphere were studied in balloon tests conducted during July-Aug. 1967. Daily variations in the wind direction dispersion profiles were computed. The wind direction pulsations during early morning and evening hours were small and relatively constant in altitude, the average being 8-10 deg. Increasing pulsation in the ground layer, probably due to the development of thermal turbulence, during the hours before noon was observed. The general increase in the wind speed across the entire layer investigated due to intense turbulent exchange during the afternoon hours caused the vertical profile of the wind direction dispersion to become less pronounced. The dispersion reached its maximum value, and stratification within the layer investigated was observed. The surface roughness had considerable influence on the wind direction pulsations in the ground layer of the atmosphere. The relationship between the wind direction pulsations and the wind direction was largely determined by the synoptic conditions. A sharp decrease in the wind direction dispersion with increased wind speeds up to 12-13 m/sec in the upper, and up to 7 m/sec in the lower part of the layer investigated was noted. The limited scope of the investigations did not allow relationships between the extent of wind direction pulsations and the atmospheric stability to be determined.

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26609 **APTIC NO. 48192**

Abhivantanaporn, Phodi and R. A. Gardner

INFRARED SPECTRA OF CARBON MONOXIDE ON RUTHENIUM PREDICTED BY INTERMEDION THEORY. J. Catalysis, 27(1):56-59, Oct. 1972. 6 refs.

The infrared spectra of weakly bonded species from carbon monoxide in contact with adsorbents containing chromium, iron, copper, and nickel were characterized as intermedions. The vibrational frequencies of these CO intermedions were related to the electronic energy levels of gaseous ions of these metals. From this relationship and the electronic energy levels of ruthenium II and III, the vibrational frequencies were calculated for CO intermedions on adsorbents containing ruthenium. The infrared spectra of weakly bonded CO on these adsorbents showed bands at the calculated frequencies of 2146, 2074, and 2041/cm. The vibrational frequencies of species strongly bonded to the surface were also computed. (Author abstract modified)

26610 **APTIC NO. 48181**

Anderson, Richard, Robert Sutherland, and Norman Frey

RADIATIVE LIFETIMES OF THE A2 PI STATE OF CO+. J. Opt. Soc. Am., 62(10):1127-1130, Oct. 1972. 8 refs.

The radiative lifetimes of the A2 pi state of carbon monoxide(+) for the vibrational levels nu prime equal to 1, 2, 3, 4, 5, and 6 were measured with a spectrophotometer at six pressures. The lifetimes extrapolated to zero pressure were 3.97 + or 0.12, 4.11 + or 0.27, 3.16 + or - 0.57, 3.95 + or - 0.09, 4.11 + or - 0.27, and 3.98 + or 0.12 microseconds, respectively. The corresponding oscillator strengths for the (1,0), (2,0), (3,0), (4,0), (5,0), and (6,0) transitions were 0.000458, 0.000659, 0.000682, 0.000571, 0.000409, and 0.000259, respectively. The measured lifetimes were longer than those measured by previous investigators, and were more consistent. From the lifetimes, transition moments were evaluated; from the transition moments, oscillator strengths were evaluated for the transitions to nu prime equals 6 and nu double prime equals 7. (Author abstract modified)

26611 **APTIC NO. 47940**

Ashihara, Kazunori, Tsuguo Abe, and Matsuo Kodaka

COMPUTER PROCESSING OF ENGINE EXPERIMENT AND EXAMPLE OF ITS APPLICATION. (Enjin jikken no densan shori to sono oyorei). Text in Japanese. Preprint, Ministry of Transportation (Japan), Traffic Safety and Nuisance Research Inst., p. 92-100, 1972. 3 refs. (Presented at the Traffic Safety and Nuisance Research Institute, Research Meeting, 2nd, Tokyo, Japan, Nov. 8, 1972.)

A new computerized data processing system developed to process various data obtained from the drive simulation engine experiments is described. The simulator has been developed for multi-purpose experiments, not for a specific type of experiment only. This data processing system is an off-line system that permits more freedom of use since it must be capable of processing the multi-element data as desired. Originally a common use type, the computer has no input/output devices specially designed for processing of the engine experiment data. Therefore, the data logger installed in the experiment room for stocking of multi-element data is equipped with an editing function so that the stocked data may be selected and put onto paper tape when desired. This, combined with the software especially designed for use with this system, assures the system high efficiency close to that of an on-line system. Data collection is made by the high-speed logger. Various data go through converters into the input amplifiers of the logger and are finally converted to 0-1 V signals. They are then stocked in the core memory as values of three figures, 000-999, together with the experiment number, and transmitted into the magnetic taping device. The number of input channels is 1-25, any number of which can be selected. Start/stop control of the data collection can be made in four different ways, Manual/Manual, Manual/Auto, Auto/Auto, or Auto/Manual. Desired data can be taken out as output on a paper tape by the desired experiment number on the logger. An example of an application of this system to the 10-mode test with the simulator is discussed; results are shown.

26612 **APTIC NO. 48187**

Bills, J. M., K. S. Brier, L. G. Danko, F. J. Kristine, S. J. Turco, K. S. Zimmerman, P. M. Divelbiss, and S. L. Tackett

X-RAY FLUORESCENCE DETERMINATION OF LEAD IN GASOLINE. J. Chem. Educ., 49(10):715-716, Oct. 1972. 7 refs.

The determination of lead in gasoline by X-ray fluorescence spectrometry is discussed. Both the quantitative and qualitative analyses are simple, straightforward, reliable and rapid. No sample pretreatment is required, since the liquid samples can be measured directly as recieved. A laboratory experiment to determine lead and bromine in gasoline is described. Experimental procedure, equipment and results are presented. The relative intensities of lead and bromine peaks for various gasoline samples were compared.

26613 **APTIC NO. 48136**

Davis, Allyn M. and William H. Corcoran

RATE AND MECHANISM OF THE PARTIAL OXIDATION OF ACETALDEHYDE BY PARTS-PER-MILLION CONCENTRATIONS OF NITROGEN DIOXIDE. Ind. Eng. Chem. Fundamentals, 11(4):431-439, Nov. 1972. 31 refs.

The thermal reaction between nitrogen dioxide and acetaldehyde in the gas phase was studied at ambient temperature and atmospheric pressure in a constant-volume batch reactor. Initial partial pressures of NO2 varied within 0.01-0.03 mm, with the partial pressure of acetaldehyde at 20-50 mm. The initial rate of disappearance of NO2 was determined at an order of 1.00 + or 0.03 for NO2 and 1.00 + or 0.07 for acetaldehyde. From data for initial rates at 22.0 C, a second order rate constant of (8.596 + or 0.189) times 0.001 l/mole-sec was determined at a total pressure of 1 atm. The activation energy of the reaction was 12,900 + or 600 cal/mole in the temperature range of 22-122 C. The primary products of the reaction were nitric oxide and carbon dioxide, with secondary products of methyl nitrite and nitromethane and a trace amount of trans-dimeric nitrosomethane. Addition of NO increased the rate of formation of nitromethane and decreased the rate of formation of methyl nitrite. The addition of glass wool or glass beads to the reactor had no measurable surface effects. (Author abstract modified)

26614 **APTIC NO. 48156**

DeMore, W. B.

PRESSURE DEPENDENCE AND MECHANISM OF THE REACTION OF ATOMIC OXYGEN AND CARBON MONOXIDE. J. Phys. Chem., 76(24):3527-3532, Nov. 23, 1972. 13 refs.

The rate of the oxygen and carbon monoxide (O + CO) reaction was measured at room temperature within 0.74-41.9 atm with carbon dioxide or nitrogen as the major third body. The method was based on relative rate measurements, with the O + O2 reaction as reference. The pressure dependence was more complex than that normally observed for simple atom association reactions. Below 1 atm, the reaction appeared to be intermediate between second and third order. However, at higher pressure, the rate constant increased. Detailed reaction mechanisms are suggested. (Author abstract modified)

26615 **APTIC NO. 48157**

Ellis, William D. and Paul V. Tometz

ROOM-TEMPERATURE CATALYTIC DECOMPOSITION OF OZONE. Atmos. Environ., 6(10):707-714, Oct. 1972. 18 refs.

Thirty-five materials, including charcoal, metals, and metal oxides, were tested for their room temperature catalytic efficiency in decomposing ozone. Charcoal and nickel oxide were determined the best catalysts. A one-half inch thick filter bed of these materials initially removed 95 and 80%, respectively, of the ozone from a 1 cu ft/min air stream containing 250 ppb of ozone. The catalytic efficiency of all the materials degraded with time. In operating parameter tests, the efficiencies of charcoal and NiO at a constant flow rate were nearly invariant over input ozone concentrations ranging from 45 ppm to 1.0 ppm; at a constant input ozone concentration, their efficiencies decreased with an increase in flow rate over the range 0.14-1.17 cu ft/min. (Author abstract modified)

26616 **APTIC NO. 48221**

Fenimore, C. P.

FORMATION OF NITRIC OXIDE FROM FUEL NITROGEN IN ETHYLENE FLAMES. Combustion Flame, 19(2):289-296, Oct. 1972. 7 refs.

The yield of nitric oxide from small additions of various nitrogen compounds was measured in premixed ethylene flames of various mixture strengths (phi equals 0.9-2.0) and temperatures (1860-2250 K). The additives were pyridine, methacrylonitrile, methyl amine, or ammonia. An equation was computed to define the observations, where (N) represents the nitrogen compound added, expressed as ppm NO if all N formed NO; (NO) represents ppm NO formed from the additive; and X is a parameter characteristic of the flame and independent of (N). The parameter X is a normalizing factor for (N), with the yield (NO)/(N) the same in all flames at equal (N)/X. For small (N)/X, (NO) equals (N); for large (N)/X, (NO) equals X and is independent of (N). The values of X were larger the hotter and the less fuel-rich the flame and were consistent with the identification X equals (2-3) (OH) where (OH) represents ppm hydroxyl radicals in the flame. (Author abstract modified)

26617 **APTIC NO. 48190**

Feugier, A.

SOOT OXIDATION IN LAMINAR HYDROCARBON FLAMES. Combustion Flame, 19(2):249-256, Oct. 1972. 12 refs.

The combustion rate of soot particles at temperatures greater than 2000 K was investigated using an experimental device in which soot particles are made to oxidize by subjecting fuel-rich combustion gases to an oxidizing flow. The optical technique was used to follow in time the variations in soot particle concentration, enabling a kinetic expression to be deduced between 2000-2300 K for the oxidation of these particles, with an activation energy of 33,000 cal/mol. (Author abstract modified)

26618 **APTIC NO. 48137**

Friswell, N. J. and D. R. Jenkins

IDENTIFICATION OF LEAD COMPOUNDS IN FLAMES AND DETERMINATION OF THE PBO BOND ENERGY. Combustion Flame, 19(2):197-201, Oct. 1972. 10 refs.

Atomic absorption spectroscopy was used to measure the concentrations of lead and hydrogen atoms as functions of distance from the reaction zone in flat premixed hydrogen/oxygen/nitrogen flames. In fuel-rich flames, all of the lead added to the flame existed as lead atoms. In lean flames, significant amounts of lead monoxide were formed. The value for the bond dissociation energy of PbO was determined at 382 kJ/mole. (Author abstract modified)

26619 **APTIC NO. 47831**

Gaedtke, H., H. Hippler, and J. Troe

STUDY OF THE PRIMARY PROCESS OF NO2 PHOTOLYSIS AT HIGH PRESSURES. Chem. Phys. Letters (Amsterdam), 16(1):177-179, Sept. 15, 1972. 21 refs.

The quantum yield of the nitrogen dioxide photolysis in the carrier gas nitrogen was measured in the wavelength 3100-4100 A at pressures up to 1000 atm. Photodissociation rates of NO2 are examined. (Author abstract)

26620 **APTIC NO. 48311**

Hirano, Hideo

STUDIES ON AIR POLLUTANTS IN CITY STREETS. (Shigaichi taiki osen busshitsu ni kansuru kenkyu). Text in Japanese. In: Taiki osen oyobi suishitsu odaku no jintai ni ataeru eikyo chosa kenkyu (1971). (INVESTIGATION AND RESEARCH ON THE EFFECT OF AIR AND WATER POLLUTION ON THE HUMAN BODY. (1971)). p. 27-28, June 1972.

In order to clarify the natural purification mechanism of toxic gases, experiments were conducted using pollutants and the soil. Carbon dioxide, nitrogen dioxide, sulfur dioxide, and acrolein wery used. A 1 kg sample of soil was put in 50-liter containers, and after sealing air tight, various gases were supplied in a separate container, and the reduction rate of the gases was measured periodically. The results of these containers were compared with the similar experiments using treated soil. The soil was heated at 200 C for 30 min, bacteria were killed, and the natural water content in thre process was supplied back by adding disinfected water. When the soil was not treated, the 10,000 ppm CO reduced to 0 in 5 days. When the treated soil was used, the CO content rose slightly on the first day, returned to 10,000 ppm on the second day, and stayed on the same level for the rest of the days. The entire 50 ppm of NO2 disappeared in an hour when using either treated or untreated soil. With SO2, 20 ppm content reduced to zero in 1 hour with the untreated soil; when using treated soil, some of SO2 remained at the end of one hour; when using treated soil without additional water, even more SO2 remained in the container. Acrolein was reduced drastically in the untreated soil, in 1 hr, gradually reducing after that to 0 in 20 hr. In the treated soil container, the original 5000 ppm reduced gradually, and in 20 hr, about a half of the original amount remained. The above tests showed a general difference between bacterial reaction and physio-chemical decomposition or adsorption of these gases in the natural environment.

26621 **APTIC NO. 48312**

Hirano, Hideo

APPLICATION OF, AND STUDIES ON TRACEABLE TOXIC GAS ELIMINATION METHODS. (Biryo yugai gasu jokyo-ho ni kansuru oyo kenkyu). Text in Japanese. In: Taiki osen oyobi suishitsu odaku no jintai ni ataeru eikyo chosa kenkyu (1971). (INVESTIGATION AND RESEARCH ON THE EFFECTS OF AIR AND WATER POLLUTION ON THE HUMAN BODY. (1971)). p. 29-30, June 1972.

The behavior of certain bacteria in the soil with regard to carbon monoxide was examined by the following experiments. A previous report showed how much of 10,000 ppm CO reacted to a bacterial culture by repeated exposures. Using bacteria which reacted exclusively to CO, the reduction of traceable CO was measured in closed containers. The same bacterial culture was placed in 10,000 ppm CO repeatedly, and the speed of absorption was observed. In the first test, the reduction of 10,000 ppm took 5 days; on the fourth test 10,000 ppm was absorbed in 1 day. By using 14 selective cultures, similar experiments were made, and only one kind of culture reacted to CO. A 0.05 ml sample of diluted liquid of the same bacteria was reacted to 4 ml of CO tracer. Decay/min rose to 500 ppm on the first day, slightly rose on the second and third days, and began to descend drastically on the fourth day, reaching the lowest value on the fifth day. Some bacteria which reacted selectively to CO existed in the soil, but further studies are needed for the distribution, characteristics, and activities of such bacteria.

26622 **APTIC NO. 48456**

Ivanov, A., O. Eyzen, and A. Yagomyagi

STUDIES OF HYDROCARBONS AND CARBON MONOXIDE OXIDATION ON PLATINUM CATALYST. (Issledovaniye okisleniya uglevodorodov i okisi ugleroda na platinovom katalizatore). Text in Russian. Eesti NSV Tead. Akad. Toim., 21(1):85-88, 1972. 9 refs.

The oxidation of hydrocarbons and carbon monoxide on a platinum catalyst in a helium flow was studied in a gas chromatograph with one column filled with a platinum catalyst kept at a temperature of 300-350 C and with another column filled with silica gel for the identification of the oxidation products. Carbon dioxide was the sole oxidation product from hydrocarbons. With no chemically adsorbed oxygen on the regenerated platinum catalyst, autooxidation of CO in the helium flow was observed. Conversion of CO into methane on platinum catalyst in a hydrogen flow was determined.

26623 **APTIC NO. 48070**

Jones, E. G., J. H. Beynon, and R. G. Cooks

KINETIC ENERGY RELEASE IN THE DISSOCIATION OF SOME SIMPLE MOLECULAR IONS. WATER AND HYDROGEN SULFIDE. J. Chem. Phys., 57(8):3207-3212, Oct. 15, 1972. 32 refs.

The technique of ion kinetic energy spectroscopy has been applied to a study of sulfur(+) formation from hydrogen sulfide(+) and oxygen(+) formation from water(+). Unimolecular formation of S+ occurs by predissociation of the first excited state via the repulsive 4A2 state of H2S+. Above the classical crossover region, this reaction proceeds rapidly on the mass spectrometer time scale, but tunneling through the barrier occurs slowly and gives rise to metastable ions which fragment with conversion of all the available potential energy to kinetic energy. Collisional excitation of ground state H_2S^+ yields excited ions which rapidly dissociate via the 4A2 repulsive surface to give substantially excited (nu equals 2) hydrogen. This reaction occurs with the partitioning of some 30% of the available energy into translational energy of the products. The heat of formation of S^+, determined from the appearance potential, requires only slight correction for the excess energy term arising from the potential energy difference between the crossover region and the ground state of the products, because the repulsive surface is unusually flat. Ground state H_2O^+ ions undergo collision induced excitation with loss of 22 plus or minus 4 eV of kinetic energy to give a high energy excited state which fragments directly to give O^+(2D or 2P) and vibrationally excited H_2. Appearance potential measurements do not provide reliable assignment of the products because of the excess energy terms. These results are in contrast to earlier conclusions that fragmentation upon electron impact yields to H_2 atoms. (Author abstract)

26624 **APTIC NO. 47834**

Jones, Peter W. and Albert H. Adelman

PHOTOSULFOXIDATION OF HYDROCARBONS IN THE LIQUID PHASE. Environ. Sci. Technol., 6(10):933-934, Oct. 1972. 18 refs.

The photosulfoxidation of aliphatic hydrocarbons in the liquid phase was studied to identify the major reaction products by gas chromatography combined with mass spectral analyses and infrared spectroscopy. Pure hydrocarbon was irradiated with a high pressure mercury arc equipped with a filter which transmits wavelengths longer than 2900 A, while sulfur dioxide and oxygen were bubbled through the liquid at 22 C. The mechanism of triplet SO_2 quenching to form photosulfoxidation products is discussed.

26625 **APTIC NO. 47915**

Kasaoka, N., E. Sasaoka, and T. Iwata

CATALYTIC REDUCTION REACTION OF SULFUR DIOXIDE BY CARBON MONOXIDE. (Aryusan gasu no issankatanso ni yoru sesshoku kangen h[illegible]ao ni tsuite). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 199-200, 1972. (Presented at the Japan Society of Chemical Engineering, Autumn Conference, 6th, Tokyo, Japan, Nov. 27-30, 1972.)

The effect of about 50 catalysts on the catalytic reduction of sulfur oxides by carbon monoxide was examined. Most of catalysts were the ones made by precipitating nitrates and sodium carbonate at 70 C followed by calcination for 5 hours at 550 C in air. The experiments were made by a common pressure flow method (the inside diameter of the reaction tube was 12.0 mm.) at 550 C in most cases. The catalysts were subjected to hydrogen reduction for 1 hour at 550 C prior to the SO_2 reduction. The reacting gas (2% SO_2, 4.4% CO, 6.6% water, 0-2% oxygen, and the rest nitrogen at the input was passed at 500 N cu m/min. The analysis was made by gas chromatography, with the exception of sulfur. The products, besides sulfur and carbon dioxide were hydrogen, hydrogen sulfide, carbonyl sulfide, carbon disulfide and water. The formation of CS_2 was negligible, but generally with the coexistence of H20 the activity fell; with H2O-O2 or increasing concentration of 02 most of the catalysts underwent a considerable deterioration. For example, in the 2SO2 4.4CO - 6.6H2O - 02 - N2 series, in which the formation of sulfur was examined when the oxygen concentration was lowered from 1% to 0.5 to 0%, the majority showed a SO_2 reduction tendency at the 1% oxygen concentration.

26626 **APTIC NO. 48106**

Kirkbright, G. F., Maurice Marshall, and T. S. West

DIRECT DETERMINATION OF SULFUR IN OILS BY ATOMIC ABSORPTION SPECTROMETRY USING AN INERT GAS SHIELDED NITROUS OXIDE-ACETYLENE FLAME. Anal. Chem., 44(14):2379-2382, Dec. 1972.

An experimental atomic absorption spectrometer for direct determination of total sulfur in crude and fuel oils is described. A sulfur microwave-excited electrodeless discharge lamp source and inert gas separated nitrous oxideacetylene flame were used in conjunction with a vacuum monochromator equipped with a photomultiplier and digital frequency meter to permit detection by photon counting. The direct nebulization of diluted oil samples into the inert gas separated nitrous oxide-acetylene flame permitted the rapid determination of their sulfur content at 180.7 nm with acceptable accuracy and precision. The attainable sensitivity should be sufficient for determination of sulfur in most refined oils (except motor gasoline). Standard solutions were prepared by dissolving dibenzyl disulfide in methyl isobutyl ketone; no errors due to the presence of different sulfur compounds in oils were observed using this compound. A standard additions technique eliminated the need to match standard and sample compositions accurately via use of a sulfur-free base oil.

26627 **APTIC NO. 48007**

Kobayashi, Masayoshi and Haruo Kobayashi

APPLICATION OF TRANSIENT RESPONSE METHOD TO THE STUDY OF HETEROGENEOUS CATALYSIS. I. NATURE OF CATALYTICALLY ACTIVE OXYGEN ON MANGANESE DIOXIDE FOR THE OXIDATION OF CARBON MONOXIDE AT LOW TEMPERATURES. J. Catalysis, 27(1):100-107, Oct. 1972. 12 refs.

The nature and behavior of the surface oxygen species on manganese dioxide were studied in detail by means of the transient response method. The surface oxygen on MnO_2 during the oxidation of carbon monoxide at -15 C was classified into two parts, the oxygen of higher oxidation power, Os to the (h) power, and the oxygen of lower oxidation power, Os to the (l) power. The Os (h) was responsible for the catalytic activity of this oxide. The amount of Os (h) was in good agreement with that obtained by the analysis with the potassium iodide method. The Os (h) is in the forms of O_2(-) or O(-) and is rapidly regenerated with the gaseous O_2 during the catalytic oxidation of CO. This regeneration seems to take place instantaneously upon the release of electrons as the sequence of the reactions between the ionized oxygen species and the gaseous carbon monoxide followed by the desorption of carbon dioxide formed. The Os (l), probably in the form of O_2 molecules, can transform into Os (h) but the rate is very slow. (Author abstract modified)

26628 **APTIC NO. 48087**

Kobayashi, Masayoshi and Haruo Kobayashi

APPLICATION OF TRANSIENT RESPONSE METHOD TO THE STUDY OF HETEROGENEOUS CATALYSIS. II. MECHANISM OF CATALYTIC OXIDATION OF CARBON MONOXIDE ON MANGANESE DIOXIDE. J. Catalysis, 27(1):108-113, Oct. 1972. 11 refs.

The mechanism of the oxidation of carbon monoxide over manganese dioxide was studied by a transient response method. To follow the transient behavior, measurements were made on the time dependencies of the reaction gas composition and of the electrical conductivity of the catalyst. The analyses of the response curves showed that the gaseous CO reacts directly with the surface oxygen species, which is negatively charged, to form some intermediates, which successively decompose to form carbon dioxide. The amount of CO_2 existing on the surface during the reaction under steady states was larger than the equilibrium amount, which was calculated from the adsorption isotherm specified by the Langmuir equation; the desorption step of CO2 may be one of the slower steps in the overall reaction. (Author abstract)

26629 **APTIC NO. 48292**

Monroe, E. S.

EQUATIONS FOR DETERMINING EXCESS AIR FROM OXYGEN ANALYSIS OF COMBUSTION GASES. Combustion, 44(3):30-32, Sept. 1972.

Equations for determining excess air present in combustion gases are developed. As shown by a basic equation, excess air is not always proportional to the oxygen volume measured in combustion products -- a constant, K, can account for variations in both the fuel and sampling methods. This constant, which can vary by a factor of three, is lowest for the combustion of pure hydrogen or sulfur and highest for fuels high in nitrogen. Additional equations for K are developed for various sampling methods. Excess air formulas are derived for pure carbon and for fuels containing hydrogen or appreciable amounts of nitrogen. Values of various constants for some typical fuels are given.

26630 **APTIC NO. 48173**

Nix, N.

GROWTH RATES OF H2O DROPLETS IN CONDENSATION NUCLEI COUNTERS. (Wachstumsgeschwindigkeiten von H2O-Tropfen in Kondensationskernzaehlern). Text in German. Arch. Meteorol. Geophys. Bioklimatol. Ser. A. (Vienna), 21(4):307-318, 1972. 10 refs.

Concentrations of atmospheric aerosols are measured using them as condensation nuclei. The air samples are passed into a condensation nuclei counter which is saturated with water vapor. Through adiabatic expansion the counter is oversaturated with water vapor and the aerosols grow into water droplets. For a better knowledge of the condensation mechanism, the evaporation and condensation process of the micro-droplets was studied while the thermodynamic parameters such as pressure, temperature, and over-and undersaturation were continuously measured. In a wall-free volume which was observed through a microscope, periodic pressure fluctuations were produced and passed symmetrically to the observation point from both sides into the condensation chamber. The pressure fluctuations produced over and undersaturation in rhythmical succession in a water vapor saturated room. Through imparting an elliptical movement on the particle which is synchronized with the sinoidal pressure change, the process of condensation and evaporation becomes visible when photographed. The growth and evaporation process of water droplets below 1-micron in diameter was photographically recorded with a scattering light photometer. The growth process extended over the entire period of oversaturation, the evaporation process over the entire period of undersaturation.

26631 **APTIC NO. 47914**

Ogasawara, M., T. Takagi, K. Fujii, and M. Tomita

FORMATION OF NO IN A TURBULENT GAS DIFFUSION FLAME. (Ranryu gasu kakusan kaen ni okeru NO seisei ni tsuite). Text in Japanese. Preprint, Japan Combustion Research Group, p. 120-123, 1972. 4 refs. (Presented at the Combustion Symposium, 10th, Tokyo, Japan, Dec. 1-2, 1972.)

The concentration and temperature distribution of nitric oxide and other gases in the turbulent diffusion flame when a gaseous fuel is ejected into air in the form of a coaxial jet were measured. In the experimental equipment used in this test, propane is ejected through a nozzle and burned with air coming through a preheater, wire netting, and contracted area in a combustion tube at atmospheric pressure. Through the combustion tube, the shape of flame can be observed. The ejecting rate of propane was about 30 m/sec, and the flowing amount was constantly maintained to about 90 cu cm/sec at 25 C. In analysis of NO, an infrared spectrometer was used, and for carbon monoxide, carbon dioxide, nitrogen, oxygen, hydrogen, methane, propane, and other hydrocarbons, a gas chromatograph was used. The results showed that NO is formed in the high temperature area more than in the low temperature area of the central part and that the concentration gradually became uniformed by diffusion. Over 70% of the NO is formed at a place corresponding to about 2/3 of the length of flame. If the amount of air is increased, the formation of NO does not decrease and tends to increase rather than at the theoretical air/fuel ratio.

26632 **APTIC NO. 47817**

Phalen, Robert F.

EVALUATION OF AN EXPLODED-WIRE AEROSOL GENERATOR FOR USE IN INHALATION STUDIES. Aerosol Sci., 3(5):395-406, Sept. 1972. 26 refs.

An exploded wire aerosol generator was evaluated using test aerosols derived from silver wires, and results were compared with existing published information on exploded wire particles. Aerosol properties relevant to inhalation studies were emphasized. Primary particles were spherical, metallic, and distributed nearly lognormally by volume, with count median diameters between 0.05 and 0.008 micron. The primary particle size decreased as the explosion energy per unit mass of wire was increased. Primary particles rapidly formed agglomerates of up to hundreds of spherical units but an air blast aimed at and synchronized with the wire explosion was successful in reducing agglomeration. Agglomerate aerosols with submicron aerodynamic diameters were produced by rapidly diluting the explosion zone after the air blast. Agglomerates of 0.026 micron count median diameter primary particles had measured specific surfaces of 16.4 sq m/g and solubility rate constants of 10 micrograms/sq cm/day in a lung fluid simulant-containing protein. The relevance of exploded wire agglomerates to inhalation studies is briefly discussed. (Author abstract modified)

26633 **APTIC NO. 47818**

Pich, Josef

THEORY OF GRAVITATIONAL DEPOSITION OF PARTICLES FROM LAMINAR FLOWS IN CHANNELS. Aerosol Sci., 3(5):351-361, Sept. 1972. 7 refs.

A simple, analytical calculation method which enables the determination of the precipitation efficiency of channels of different cross sections was developed, based on the analysis of limiting trajectories of particles. Using this method the problem of gravity deposition of colloid particles from laminar flow in rectangular channels, from laminar flow of fluid with a free surface, and from laminar flow in circular and elliptical horizontal channels is solved. (Author abstract modified)

26634 **APTIC NO. 48158**

Rains, Theodore C. and Oscar Menis

DETERMINATION OF SUBMICROGRAM AMOUNTS OF MERCURY IN STANDARD REFERENCE MATERIALS BY FLAMELESS ATOMIC ABSORPTION SPECTROMETRY. J. Assoc. Offic. Anal. Chemists, 55(6):1339-1344, Nov. 1972. 7 refs.

In a study of the flameless atomic absorption method for the determination of nanogram amounts of mercury in organic materials, the technique was improved to provide greater precision and accuracy. The loss of mercury during the digestion of organic materials with nitric, sulfuric, and perchloric acids is prevented by controlled heating and a packed refluxing column. The reduction and absorption system was simplified by using a heated absorption cell which alleviates the interference of volatile vapors. This method was applied to the determination of mercury in NBS Standard Reference Materials of orchard leaves, liver, and coal, and the results were compared with results obtained with two other analytical methods.

26635 **APTIC NO. 48147**

Shelef, Mordecai and Haren S. Gandhi

AMMONIA FORMATION IN CATALYTIC REDUCTION OF NITRIC OXIDE BY MOLECULAR HYDROGEN. II. NOBLE METAL CATALYSTS. (Ind. Eng. Chem. Prod. Res. Develop., 11(4):393-396, Dec. 1972. 6 refs.

Ammonia formation during the reduction of nitric oxide by hydrogen over platinum, palladium, ruthenium, and osmium catalysts was investigated. As in the case of the base metal oxide catalysts, NH3 formation first increased and subsequently decreased with increasing temperature. On Pt and Pd catalysts, NH3 formation decreased in the presence of carbon monoxide; on a Ru catalyst, NH3 formation 0was enhanced. Of the catalysts studied, Ru had the best selectivity toward the defixation of NO to molecular nitrogen. Small amounts of oxygen had little effect on the catalytic behavior of noble metals, provided an overall stoichiometric excess of hydrogen was present. (Author abstract modified)

26636 **APTIC NO. 47848**

Shimada, Isamu, Keizo Saito, Fumitake Chisaka, and Shigeru Yanagihara

ALDEHYDES RESULTED FROM PHOTOCHEMICAL REACTIONS. (Kokagaku hanno ni yoru arudehido no seisei). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 57. (Nov. 7-9, Paper 5.)

Formaldehydes and acrolein were formed photochemically in a smog chamber. The volume of the smog chamber was 11 cu m, and the test gas was radiated by 300 ultraviolet fluorescent light tubes through a teflon film. Formaldehydes were analyzed by an improved pararosanilyn method, and acrolein was analyzed by the 4-hexylresorcinol method. The formaldehyde and acrolein formation increased when the concentration of hydrocarbons was great. There was almost no effect of nitrogen oxides; formaldehyde is especially formed from olefins; acrolein is especially formed from 1.3 butadiene, and aldehyde remains for a long time. The concentration of the formed aldehyde is high when the temperature of radiation is high.

26637 **APTIC NO. 48177**

Shindo, Kotaro, Akira Araoka, Kunihiko Asakuno, Yoshiharu Shinozaki, and Toshio Ohira

CHEMICAL KINETICS OF PHOTOCHEMICAL SMOG. (Kokagaku sumoggu no kagaku dorikigaku). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 59. (Nov. 7-9, Paper 7.)

Due to lack of information on and reliability of the reaction mechanism of photochemical smogs, it is extremely difficult to obtain reaction speed indexes and a series of reactions induced by the reaction speed. A method of simulation without damaging the nature of all the elements must be devised. As one method of solving these problems, a vast number of various chemicals (42 in all) were selected and divided into four groups, and photochemical kinetics patterns were obtained mathematically. Most of these chemicals were hydrocarbons and nitrogen oxides. Class one was given a simulated reaction; class two was examined by the nine-elements simultaneous equation; class three elements were analyzed by differential equations by substituting the figures of class two. When the reaction mechanism was known but the speed was unknown, they were conjectured taking similar element, or the figures were obtained theoretically. The figures of class four were permanent. The results are presented in a graph, showing the relationship between concentration and time.

26638 **APTIC NO. 48079**

Stavinoha, L. L. and F. M. Newman

THE ISOLATION AND DETERMINATION OF AROMATICS IN GASOLINE BY GAS CHROMATOGRAPHY. J. Chromatographic Sci., 10(9):583-589, Sept. 1972. 3 refs. (Presented at the American Chemical Society, National Meeting, Boston, Mass., April 1972.)

The conditions under which N,N-bis(2-cyanoethyl) formamide (CEF) can be used as a liquid phase for the gas chromatographic separation of aromatics from the other components of motor gasolines having final boiling points no greater than 486 F were determined. Quantitative analyses of aromatics in gasoline are used in the study of engine deposits and exhaust emissions. A multiple-oven gas chromatographic system employing an isothermal CEF column, appropriate valving, a liquid sampling valve, and a temperature-programmed Dexsil 300 column was used to provide analyses of the aromatic and the saturate-olefin fractions of gasolines. Highly precise volumetric analyses were made of the benzene, toluene, ethylbenzene, m+p-xylene, o-xylene, isopropylbenzene, and C9+ aromatics using a direct calibration method. Procedures are described for the determination of the boiling point distribution of both the aromatic and saturate-olefin fractions of the gasolines. Provisions for extending the procedure to higher boiling point materials are discussed. (Author abstract modified)

26639 **APTIC NO. 48099**

Stersky, Attila K., D. R. Heldman, and T. I. Hedrick

EFFECTS OF AEROSOLIZATION ON SALMONELLA NEWBRUNSWICK. Milk Food Technol., 35(9):528-531, 1972. 9 refs.

Salmonella newbrunswick was aerosolized with distilled water into a duct with controlled temperature and relative humidity. Airborne bacteria were collected on a membrane filter and held in the airstream for 1/2 hr. Cells were rehydrated and held in distilled water for 1/2 hr; they were then centrifuged and the supernatant fluids tested for various inorganic and organic materials that are essential for normal functions. Spot tests revealed potassium, magnesium, phosphates, simple carbohydrates, and amino acids in the supernatant fluid from the bacteria. Sodium was definitely identified in less than 10% of the tests. The leakage of these materials appeared to signify an increase in permeability damage to the cell membrane. An increase over the unaerosolized control in absorbance of the supernatant fluids at 265 nm was noticed. This increase was attributed to partial destruction of ribosomes observed by electron microscopy. (Author abstract modified)

26640 **APTIC NO. 47920**

Suzuki, Shin, Nobutoshi Horiuchi, Noriyasu Imai, and Wataru Ando

PHOTOCHEMICAL REACTION BETWEEN SO2, ORGANIC COMPOUNDS, AND OXYGEN. (Aryusan gasu-tankasuiso-sansokei no kokagaku hanno). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972. p. 53. (Nov. 7-9, Paper 1.)

Comparative experiments were made on the photochemical reactions of the atmospheric sulfur dioxide and hydrocarbons when highly reactive oxygen was present and not present. In a test tube, SO2 sis-2-butene, and oxygen were poured in and a 450 W high voltage mercury lamp was applied for irradiation. The gaseous formation was analyzed by gas chromatography. The sis transmutation seemed to occur more readily when oxygen did not exist. The SO2 absorbed light and collided with excited SO2 gas-sis-butene-2; energy transference occurred causing the transmutation. This transmutation did not occur when oxygen was present. This is probably because the excitation energy was spent when the excited SO2 gas-sis-butene 2 collided with oxygen for purposes other than transmutation.

26641 **APTIC NO. 48163**

Tejwani, G. D. T.

CALCULATION OF PRESSURE-BROADENED LINEWIDTHS OF SO2 AND NO2. J. Chem. Phys., 57(11):4676-4681, Dec. 1, 1972. 26 refs.

Sef-broadened and foreign-gas (N2 and O2) broadened linewidths of sulfur dioxide and nitrogen dioxide were calculated using the Anderson-Tsao-Curnutte theory of line broadening. Computed values of linewidths were in good agreement with all the available experimental and reported theoretical calculations by by Murphy and Boggs on four self-broadened and one nitrogen- broadened line based upon the theory developed by them. Air broadened linewidths were calculated for SO2 at 200, 250, and 300 deg K. These results should be useful in predicting theoretical spectra of SO2 under atmospheric conditions. Such spectra are important in spectroscopic techniques for monitoring SO2. (Author abstract)

26642 **APTIC NO. 48325**

Wilson, William E., Jr. and Arthur Levy

A STUDY OF SULFUR DIDOXIDE IN PHOTOCHEMICAL SMOG. (SUMMARY REPORT). Battelle Memorial Inst., Columbus, Ohio, Columbus Labs., American Petroleum Inst. Proj. S-11, Pub. 4106, 24p., Feb. 1, 1972. 5 refs.

The nature and extent of the interaction of sulfur dioxide with the photo-induced reactions of hydrocarbons and nitrogen oxides were investigated in environmental chambers. The principal effects were on the formation of oxidants and aerosols. In a 1-butene/NOx smog system, the effects of SO2 on oxidant production depended on the concentration of water vapor, initial nitrogen dioxide, and SO2. At constant initial NO2, oxidant production decreased with added SO2 for dry and wet (65% relative humidity) systems but increased at an intermediate 22% relative humidity. In general, SO2 reduced maximum oxidant in 1-butene, 1-heptene, and 2,2,4-trimethylpentane smog systems and increased maximum oxidant in toluene smog systems. Maximum NO2, however, was reduced in all systems when SO2 was present. The production of light scattering aerosols in photochemical smog systems through the formation of sulfuric acid mist was enhanced by SO2. Aerosol formation was also highly dependent on humidity and stirring. The rate of disappearance of SO2 correlated with hydrocarbon reactivity in smog systems; SO2 depletion was rapid in olefin and alkylbenzene systems and essentially nil in paraffin systems. Reaction mechanisms and kinetics are reviewed. (Author abstract modified)

26643 **APTIC NO. 48207**

Woolley, W. D.

STUDIES OF THE DEHYDROCHLORINATION OF PVC IN NITROGEN AND AIR. Plast. Polym., 4(148):203-208, Aug. 1972. 6 refs.

Polyvinyl chloride (PVC) is widely used in buildings both in the structure and in the furnishings. When heated to temperatures above about 200 deg C, PVC releases hydrogen chloride, a toxic and corrosive gas. The release of HCl from a commercially available PVC (unplasticized) which was studied in a flow of either nitrogen or air over the critical temperature range of 200 deg C to 300 deg C is discussed. Experimental results are represented as a 3/2-order decomposition. The dehydrochlorination times for a number of isothermal decomposition temperatures in nitrogen and air are derived from the kinetic data. A general method is presented for calculating the extent of dehydrochlorination during non-linear temperature changes, as in fires. The method was checked by comparing the calculated and experimental extent of dehydrochlorination during a non-linear temperature-programmed decomposition.

26644 **APTIC NO. 47943**

Yanagihara, Shigeru

PHOTOCHEMICAL REACTION OF EXHAUST GAS. (Haikigasu no kokagakuhanno). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Kansai Branch, p. 27-36, 1972. 3 refs. (Presented at the Japan Society of Mechanical Engineers, Kansai Branch, Lecture Meeting, 17th, Osaka, Japan, Dec. 5-6, 1972.)

Photochemical reaction mechanisms of nitrogen oxides plus hydrocarbons are discussed. When NOx existing with HC in the atmosphere receives ultraviolet irradiation to cause photolysis of nitrogen dioxide oxidation of nitric oxide to NO2 is accelerated to produce aldehyde, ozone, and organic nitrogen peroxides. This reaction process is fully discussed, giving the 49 possible chemical reactions involved. The NOx-HC photochemical reaction was analyzed in a smog chamber experiment. According to the reaction process indicated by the smog chamber experiment, NO becomes rapidly oxidized to NO2 with the start of irradiation. When a considerable portion of NO has become converted to NO2, O3 begins to increase. Oxidant starts to increase later than O3. Aldehydes continue to increase from the earlier stage of irradiation while HC decreases with the irradiation. After NO2 reaches the peak value, difference between NO2 measured by the Saltzman method and NOx less NO measured by chemiluminescence method becomes greater, the reaction continuing to go on with a considerably higher value of NOx less NO. It is possible that peroxacetyl nitrate viewed as a non-ozone oxidant may be included in this NOx. With considerable progress of the reaction, increase of O3 slows and then begins tto decrease. Decrease of HC and increase of aldehydes also slows by this time. Peroxyacetyl nitrate follows almost the same pattern of O3. The above reaction processes are generally typical of the photochemical reaction of NOx-HC. The representative factors affecting the photochemical reaction are also discussed.

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26645 **APTIC NO. 48281**

DATA ON ENVIRONMENTAL STANDARDS OF NITROGEN OXIDES AND OTHER GASES (Chisso sankabutsu nado ni kakawaru kankyo kijun ni kansuru shiryo). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 7(3):33-149, 1972. 289 refs.

A very thorough compendium of previously published data on nitrogen oxides and photochemical oxidants and ozone is presented. Various measurement methods of nitrogen oxides and their principles are reviewed. The effects of nitric oxide on the living body includes the increase of methemoglobin, the impairment of enzyme activity, death, impairment of the respiratory system, and blood cell functions. The effects of nitrogen dioxide in the presence of carbon monoxide and sulfur dioxide are briefly discussed. Various experimental results and data are presented in tables, graphs, and charts. The effects of oxidants, ozone, and peroxyacetyl nitrate on the living body, especially on respiratory disease patients, are reviewed very thoroughly with data. Lastly, the effects of photochemical oxidants, NO and NO2 on plants are discussed. A chronic exposure to ozone in a work environment has an immediate effect only when the concentration goes up to 0.2 ppm. After 0.3 ppm, nose and throat irritation, and chest pressure are felt. After an 0.5 ppm concentration exposure, forced expiratory volume is reduced by 20%.

26646 **APTIC NO. 47885**

Ambs, Erhard, Arnold Vahle, and Rudolf Weise

STENOSING LYRYNGO-TRACHEITIS AND THE EFFECTS OF WEATHER CAUSED BY LAND FORMATIONS. (Stenosierende Laryngotracheitis und gelaendebedingte Wettereinfluesse). Text in German. Muench. Med. Wochschr. (Munich), 114(50):2161-2166, 1972. 19 refs.

The annual frequency of stenosing laryngo-tracheitis and the distribution according to season and time of day of the beginning of inspiratory dyspnea was studies for 259 children from 1962-1971. The majority of the children came from areas where valley inversions frequently occur. The onset of acute complaints coincided with inadequate supplies of fresh air and occasionally with air pollution. Biotropic effects of the movements of fronts, other meteorological factors, orography of the place of residence, and air pollution should be studied to determine the causes and favoring factors of respiratory diseases.

26647 **APTIC NO. 48122**

Ando, Itaru and Yasuo Horiuchi

A RESEARCH STUDY OF ASTHMATIC CHILDREN ON ENVIRONMENTAL CONTROL BOTH IN OSAKA AND NASHINOMIYA CITY. (Osaka-shi oyobi Nishinomiya-shi ni okeru gakudo no zenosoku hossa ni kansuru jittai chosa). Text in Japanese. Arerugi, 21(6):423-434, 477, June 1972. 33 refs.

A study was undertaken of asthmatic children in Osaka and Nishinomiya, Japan, between 1969 and 1971. The number of asthmatic children in primary school is larger in the lower class than in the upper class, but the difference between them is smaller in Osaka than in Nishinomiya. The number of male patients is 2.2 times greater than that of female patients in Osaka and 1.7 times greater in Nishinomiya. One-third of the children with asthma in Osaka live in wooden houses without a sunny side, while most of the children in Nishinomiya live in an old fashioned concrete apartment. One half of the families had a history of allergies. The majority of the children had their first attack of asthma under three years of age. Both bacterial and viral infections can induce asthmatic attacks, which happens more frequently during autumn and winter. In Osaka, about 40% of the children are exposed to air pollutants such as dustfall, smoke, and other irritants. Asthma attacks frequently occur during the night and early morning. Frequent coughing and wheezing are experienced by 6.5% of the children in Nishinomiya and 10.0% of the children in Osaka. While most patients are treated for an acute allergic episode, only few are started on a long term program to prevent recurrence oof the acute episode.

26648 **APTIC NO. 48202**

Barnes, John R., Paul E. Smith, and Charles M. Drummond

URINE OSMOLALITY AND DELTA-AMINOLEVULINIC ACID EXCRETION. Arch. Environ. Health, 25(6):450-455, Dec. 1972. 9 refs.

A mathematical model for the relationship between urine osmolality and delta-aminolevulinic acid (DALA) in the urine was developed from a study of three populations exposed to environmental levels (urban and rural) of lead and two populations exposed to industrial levels of lead. The equation derived from the model indicates that urine DALA is principally a function of urine osmolality when the level of lead exposure, as reflected in the urine lead, is below a threshold level. Urine DALA becomes principally a function of lead exposure when another critical level is reached. The mean values for DALA, lead, and osmolality of urine in the five populations studied are presented. By considering the influence of urine osmolality, urine DALA becomes a more sensitive means of measuring the effect of environmental levels of lead on populations. (Author abstract modified)

26649 **APTIC NO. 47861**

Belanger, William E., Igho H. Kornbluch, and Robert Wassall

THE RELATION OF HOSPITAL EMERGENCY WARD VISITS TO AIR POLLUTION AND WEATHER. Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 235-238, 1972. 6 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)

The relationship between hospital emergency ward visits and the variables of environment, weather, and air pollution was investigated. The hospital data included outpatient and emergency ward visit counts with respect to patient categories by sex, age, and complaint, i.e., cardiac, pulmonary, eye problems, seizures, strokes, nose bleeds, and traffic accidents. Air pollution data was gathered as daily averages for haze coefficient, suspended particulates, sulfur dioxide, carbon monoxide, nitrogen dioxide, total oxidants, total hydrocarbons, and nitrous oxide. Meteorological variables included temperature, precipitation (rain or snow), wind velocity and daytime sky cover. Coefficients of correlations were computed for all pairs of time series, each matched, and for each season. Complete study results are presented.

26650 **APTIC NO. 47992**

Boiteau, H. L. and S. Gelot

QUICK DETERMINATION OF THE CONCENTRATION OF CARBON MONOXIDE IN BLOOD BY INFRARED SPECTROMETRY. (Determination rapide du taux d oxyde de carbone dans le sang par spectrometrie infrarouge). Text in French. J. Eur. Toxicol., 5(4):217-222, July-Aug. 1972. 10 refs.

Carbon monoxode concentrations in the blood can be rapidly determined by infrared spectrometry, following the extraction of the gas in 1 ml of blood in a van Slyke unit in the presence of phosphoric acid. Carbonic acid and water vapor are removed from the gaseous mixture by passage over soda lime and actigel, before transfer to a plexiglass syringe serving as a graduated reservoir of variable capacity. Following dilution to 200 ml with ambient air, the carbon monoxide is measured to any concentration exceeding 0.1 ml/100 ml blood. A measurement can be made in 5 minutes, the van Slyke unit is easy to clean, and with slight modifications in the procedure, sensitivity can be improved to 0.025 ml/100 ml of blood.

26651 **APTIC NO. 47866**

Bouley, G., A. Dubreuil, and D. Pruliere

THE EFFECT OF DILUTED EXHAUST GASES AND THEIR CONDENSATES ON THE SURVIVAL OF CULTURED ESCHERICHIA COLI. (Action des gaz d echappement d un moteur a explosion et de leurs condensats, dilues, sur la survie de Escherichia coli en culture). Text in French. Pollut. Atmos. (Paris), 14(55):253-256, July- Sept. 1972. 14 refs.

The effect on non-irradiated, diluted exhaust gas and its condensate on the survival of cultured Escherichia coli was studied. An exhaust gas concentration equaling 1/20 the original concentration with 50 cu cm of carbon monoxide, 24 cu cm of nitrogen oxides, 8.5 cu cm of aldehydes and 12 cu cm of hydrocarbons/cu m of air had a quasi-limit exposure time of 1.75 hr. An additional exposure over 1.5 hr resulted in a reaction to 37% in the number of viable bacteria. An aqueous condensates of the exhaust gas in concentrations greater than 1/30 of the original value caused total inhibition of the bacterial growth. Aldehydes in moderate concentrations had slight effect, but the effect of aldehydes in concentrations greater than 1/30 of the original value was predominant due to the inhibition of the glutamic acid dehydrogenase.

26652 **APTIC NO. 47904**

Chiba, M., K. Nitta, T. Takahashi, Y. Tsukamoto, T. Nishima, and S. Kikuchi

THE EFFECT OF LEAD IN THE EXHAUST OF A CAR ON INHABITANTS BY MEANS OF MEASUREMENT OF ALAD IN BLOOD AND ALA IN URINE AT TODA AND WARABI CITY (SAITAMA PREFECTURE). (Kyojuchiiki-sa to joshi jumin no keechu ALAD oyobi nyochu ALA). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):420, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

Toda city was divided into an agricultural district (A), a residential district along the road (B), and a residential district away from the road (C). Warabi city was divided into a residential district along a big road where there is often a traffic jam (D), and the residential district along a road where there did not happen a traffic jam (E). The subjects were women aged between 21 and 69; women who were working in the industries related to lead were excluded. The average aminolevulinic acid dehydratase content in blood was A greater than C greater than B and E greater than D. The volume of traffic was A greater than C + E greater than B + D. The mutual relation between ALAD content and age of subjects was that the older the subject was, the lower was ALAD content. The mutual relation between ALAD and the number of years of residence was that the longer the subject lived, the lower was ALAD content except for the E section. But these two relations were not significant.

26653 **APTIC NO. 48090**

Cohen, Arlan A., Steve Bromberg, Robert W. Buechley, Leo T. Heiderscheit, and Carl M. Shy

ASTHMA AND AIR POLLUTION FROM A COAL-FUELED POWER PLANT. Am. J. Public Health, 62(9):1181-1188, Sept. 1972. 24 refs.

Twenty asthmatics in New Cumberland, West Virginia, reported daily symptoms for over 7 mo while air pollution and weather parameters were monitored (including suspended particulates, sulfur dioxide, soiling index, suspended sulfates, suspended nitrates, temperature, wind speed and direction, humidity, and barometric pressure). The area had high pollutant levels because of a coal-fired power plant which had no stacks, no abatement devices, and used high-ash, high-sulfur coal as fuel. Daily averages of each measured pollution or weather parameter were correlated with daily attack rate. All pollutants and temperature correlated significantly with the attack rate. January and February were the months of peak attack rate; they also had the highest pollution levels and lowest temperature levels. Peak symptoms occurred between 6 am and noon. Sulfate levels had the strongest association with attack rates after the effects of temperature were removed. Increases in air pollution had greater effects on asthmatics when the temperatures were moderate than when they were below freezing. Decreases in temperature had a greater effect on attack rates on low pollution days than on high pollution days. The temperature-independent air pollution effects occurred at levels of pollution commonly found in large cities.

26654 **APTIC NO. 48269**

Eckardt, Robert E., Harold N. MacFarland, Yves C. E. Alarie, and William M. Busey

THE BIOLOGIC EFFECT FROM LONG-TERM EXPOSURE OF PRIMATES TO CARBON MONOXIDE. Arch. Environ. Health, 25(6):381-387, Dec. 1972. 5 refs.

Cynomolgus monkeys were exposed to 19.86 and 65.46 ppm carbon monoxide for 22 hr/day, 7 days/wk for 2 yrs. Nine monkeys were exposed to each level of CO and nine were used as controls maintained under identical conditions with the exception of CO exposures. The only observed dose-related difference between the exposed and control animals was in the blood carboxyhemoglobin values which were 1.0-1.5% higher in animals exposed to 19.86 ppm CO and 6-8% higher in the animals exposed to 65.46 ppm CO. Elevated carboxyhemoglobin levels did not lead to compensatory increases in hematocrit, hemoglobin, or erythrocyte count determinations, nor to cardiac fibrosis or brain pathology. These COHb levels for 2 yrs did not lead to any biologically significant changes in the cynomologus monkey. (Author abstract modified)

26655 **APTIC NO. 48287**

Fouts, James R.

SOME STUDIES AND COMMENTS ON HEPATIC AND EXTRAHEPATIC MICROSOMAL TOXICATION-DETOXICATION SYSTEMS. Environ. Health Perspect., no. 2:55-56, Oct. 1972. 45 refs.

Three research programs relevant to the problems of environmental pharmacology and toxicology are described. The projects were extrahepatic toxication-detoxication systems; age-dependent changes in toxication-detoxication systems in lungs versus liver; and species differences in induction of hepatic toxication-detoxication systems by benzopyrene and DDT. In vitro studies with marker enzymes and substrates of toxication-detoxication systems showed that rabbit lung and lever fractions were similar in many respects. Many drug-metabolixing systems were concentrated in lung microsomes as they are in liver. Major differences between lung and liver were that glucose-6-phosphatase was not a good marker for lung microsomes; glucuronyl transferase activity was not detectable in lung microsomes; and cytochrome b5 and P450 contents of lung microsomes were much lower than liver microsomes. Lung and liver microsomes had similar but age-dependent levels of NADPH-cytochrome reductase and NADPH-cytochrome P450 reductase, which may be the rate-limiting step for mixed function oxidases dependent on cytochrome P450. However, substrate metabolisms such as benzopyrene, hydroxylase, aminopyrine, demethylase, and aniline hydroxylase differed by factors as great as five-fold in lung versus liver. Mice and rats showed quantitative but not qualitative differences in their response to the hepatic enzyme inducers DDT and benzopyrene. At doses or dosing schedules that clearly established induction in rats, mice did not show such induction or showed it only marginally.

26656 **APTIC NO. 48405**

Gnitko, R. V., R. S. Orlov, V. Ya. Izakov, and Yu. P. Vedernikov

THE POSSIBILITY OF CHANGE IN THE PREDOMINANT PATTERN OF ELECTRIC CURRENT GENERATION IN MYOCARDIAL CELLS OF THE FROG RANA TEMPORARIA DUE TO THE EFFECT OF DIVALENT CATIONS. (O vozmozhnosti smeny dominiruyushchego tipa elektrogeneza v kletkakh miokardia lyagushki Rana temporaria pod vilyaniyem dvukhvalentnykh kationov). Zh. Evol. Biokhim. Fiziol., 8(2):194-201, 1972. 34 refs. Translated from Russian. 15p., 1972.

Myocardial cells of the frog Rana temporaria were studied to determine changes in the electrical and mechanical responses to the action of divalent cations. Transmembrane action potentials (TAP) of strips of the myocardium were recorded. The contracting response of nickel ions (1-2 mM) prolonged the plateau phase of TAP and led to the appearance of two or more TAP in response to one irritating stimulus, accompanying the contraction response. An increase in the calcium concentration (2-4 mM) in the solution containing Ni increased the number of TAP in response to the irritating stimuli. Nickel and cadmium ions caused the appearance of spike-like activity accompanying the contracture, in response to the irritating stimuli. Adrenalin increased the frequency and propranolol eliminated the spike-like activity. Adrenalin and depolarizing current shocks and a weak effect on TAP and the contraction response in solutions containing nickel.

26657 **APTIC NO. 48111**

Goyer, Robert A. and Kathryn R. Mahaffey

SUSCEPTIBILITY TO LEAD TOXICITY. Environ. Health Perspect., no. 2:73-80, Oct. 1972. 50 refs.

Children are more susceptible to lead toxicity than adults. In children, blood lead levels above 40 microgram /100 ml may be associated with subclinical lead toxicity and levels of 80-100 micrograms/100 ml may induce convulsions and coma. Occupationally exposed adults can have blood levels of 80-100 micrograms with few or no overt symptoms of lead toxicity. Low dietary calcium, phosphorus, or iron can increase soft tissue retention of lead in children. Synergism with other toxic metals, particularly cadmium, has been suggested, but this relationship needs further study. Genetic factors, such as hemoglobin S and C and glucose-6-phosphate dehydrogenase deficiencies are also suspected of increasing susceptibility to lead. However, large-scale clinical support of this relationship is not available. Renal disease decreases lead excretion, thus enhancing body stores and toxicity. Intrinsic metabolic factors that influence subcellular partitioning of lead are also important in lead intoxication. The binding of lead as a nondiffusible protein complex in the form of intranuclear inclusion bodies in the liver and kidney may function as an intracellular detoxifying mechanism as well as facilitate renal excretion of lead. (Author summary modified)

26658 **APTIC NO. 48210**

Hashimoto, Hiroshi, Hiroyoshi Yoshida, Shigeo Maejima, Yasuji Konishi, Yutaka Yoshida, Tomoo Okami, Shigeto Sannomiya, and Takao Ogawa

INVESTIGATIONS ON THE EFFECT OF AUTOMOTIVE EXHAUST GAS IN OSAKA ON HUMAN BODIES (NO.6, SUMMARY OF THREE YEARS). (Osaka-shi ni okeru jidosha haishutsu gasu jintai eikyo chosa (sono 6, 3-nenkan no matome)). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):380, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

Investigations on environmental conditions, consciousness of the inhabitants, and general health were conducted on people living along main highways of Osaka city between Sept.-Oct. 1969, July-Oct. 1970, and Oct. 1970 and March 1972. Measurements were taken for carbon monoxide, sulfur dioxide, nitrogen oxides, oxidants, hydrocarbons, dusts, lead in dusts, wind direction, speed, and traffic rates. The health consciousness examination was given by questionnaires. For eye irritation, stuffed nose, and runny nose symptoms, 25.2% had frequent occurrences, 27.4% answered sometimes, and 47.4% answered in the negative. For sneezing, sore throat, and coughing, 31.8% had frequent occurrences, 44.5% answered sometimes, and 23.7% answered in the negative. In the polluted areas, a high percentage of people with low total blood weight was noted. Examinations revealed that they were not caused by iron difficiency.

26659 **APTIC NO. 47850**

Imai, Masayuki, Hidehiko Oshima, Fukiko Kawagishi, Katsumi Yoshida, and Masayoshi Kitabatake

AN EPIDEMIOLOGICAL SURVEY OF THE EFFECT OF AIR POLLUTION IN YOKKAICHI (CHILDREN AND ADULTS I). (Taiki osen no jintai ni oyobosu eikyo ni tsuite (shoni to seijin I)). Text in Japanese. Japan Society of Air Pollution. Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 219. (Nov. 7-9, Paper 173.)

Diagnoses and changes in clinical conditions for young respiratory patients, and the effects of air pollution on high school students in Yokkaichi were investigated. As of July 1972, the number of patients 0-5 years old was 124, 6-11 was 195, 12-14 was 34, 15-39 was 102, 40-59- was 145, and over 60 was 256 in this area. Questionnaires were given to all the freshmen and sophomores of Kitase area high schools in Mie Prefecture. The number of students who lived in polluted areas and complained of coughs, sputum, and asthmatic attacks was slightly higher than those who lived in non-polluted areas, but the difference was insignificant. The number of healthy students with no complaints varied between 86.03% (girls, who lived in suburbs and went to school in suburbs) and 69.33% (boys, commuting to outside high schools from polluted areas); but the percentage of boys in the former category was 80.21% and girls in the latter category was 74.29%. The rate of the Fletcher chronic bronchitis was very low, and there were no significant geographical differences. The number of high school patients was much lower than smaller children, and this seems to indicate that almost all young chronic congestive respiratory patients recover quickly or have only light cases. However, further follow-up examinations will have to be given to determine the long-term effects of air pollution when they grow old.

26660 **APTIC NO. 48241**

Ishikawa, K., H. Hirano, T. Shigeta, K. Hanazawa, R. Yoshida, K. Hayashi, A. Furusaku, F. Munakata, K. Nagai, and M. Miyairi

THE MEDICAL EXAMINATION OF INHABITANTS WITH REGARD TO POLLUTION BY LEAD (II). THE RESULT OF A SPECIAL EXAMINATION. (Namariosen o chushin toshita chikijumin no kenko chosa (2). Tokushu kensa kikka ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):417, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

The subjects were 222 men and 450 women aged between 8 and 88 living within 800 m of a factory which emitted over 80 mg/cu m. The average lead content in the blood of men was 14.8 micrograms/dl and that of women was 12.7 micrograms/dl. The average lead content in urine of men and women was 27.6 micrograms/dl and 24.0 micrograms/dl. The average aminolevulinic acid dehydratase content was 128.3 micron mol/ml (men) and 147.9 micron mol/ml (women) and aminolevulinic acid content was 1.30 mg/l of urine in men and 1.14 mg/l in women. There was no mutual relation betwee ALAD and Pb-B (Pb in blood) because the coefficient of correlation of ALAD and Pb-B was -0.1778 (men) and 0.0048 (women).

26661 **APTIC NO. 47928**

Ito, K. and N. Mizutani

AIR POLLUTION AND ASTHMA. (Taiki osen to zensoku). Text in Japanese. Rinsho Kagaku (Clin. Chem.), 8(11):1477-1484, Nov. 1972. 18 refs.

The origin of air pollutants, their effects, and the environmental factors of bronchial asthma are described based on a study in Yokkaichi. Four environmental factors which cause the asthmatic paroxysm are seasonal variations of passage of cold fronts; allergens, mites, and certain kinds of mold spores; climatic conditions (temperature); and air pollution. The explosive occurrence of asthma is not directly due to air pollution. Bronchial asthma occurs frequently earlier than chronic bronchitis by air pollution. Since the commencement of operation of an oil burning power plant in the first petroleum company in Yokkaichi in 1960, an increase of sulfur dioxide occurred and complaints such as cough, gasping, dyspnea, and respiratory paroxysm increased. The dust fall, floating dust, and SO2 concentrations were 7-18 t/yr, 260-359.2 mg/cu m, and 0.1-2.1 mg/cu m respectively, as compared to those of an unpolluted area of 3-6 t/yr, 211.4-234.2 mg/cu m and 0.0-0.1 mg, respectively, in 1964. The days when SO2 was over 0.3 ppm were 64% of the year. Percentages of occurrence of diseases of the respiratory system were 57.8 in men and 51.6 in women in polluted areas, as contrasted to those of 28.9 in men and 15.8 in women in unpolluted area. Those persons of ages over 40 were 15.1 in men and 11 n women in polluted areas significantly compared to those of 5.2 in men and 2.8 in women in unpolluted areas. The increase of subjective symptoms in the respiratory system, the decrease of ventilatory functions of school boys, the increase of morbidity of respiratory diseases, and the increase in mortality due to such diseases have been recognized. Since 1965, an official medical relief system has helped specified patients. The number of such specified patients as of Jan. 1972 was 703 (0.63% of the citizens) in Yokkaichi. The major diseases were bronchial asthma (37.1%), chronic bronchitis (34.8%), asthmatic bronchitis (25.6%), and pulmonary emphysema (5.6%). The public nuisance has been recognized to be air polution, consisting of the mist of sulfuric acid, frequent occurrences of high concentrations of SO2 and other gases, dusts, nitrogen dioxide, lower aldehydes and mercaptans.

26662 APTIC NO. 48131

Kamiyama, Shigetoshi, Satoru Kobayashi, and Akio Shimada

GEOGRAPHICAL COMPARISON OF PULMONARY VENTILATION OF SCHOOLCHILDREN. (Jido seito no hai kanki kino no chiikibetsu hikaku ni kansuru kenkyu). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):390, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

The pulmonary ventilation of schoolchildren were examined on 1350 children from the fifth grade through the third year in junior high school, in three different areas of a city (central Akita city), a fishing village (on Oga Peninsula), and a mountain village (at the foot of Mt. Chokai). Both boys and girls were tallest in the city area, closely followed by the children of the fishing village, and the difference between the height of the children of the mountain village and the city was almost one complete year's difference. However, there was very little or no significant differences between areas for ventilation or peak flow indexes. This testifies to the fact that pulmonary ventilation of the children from the mountain area is comparatively greater than those in the city and the fishing village.

26663 APTIC NO. 48309

Katsuki, Hideo, Shohei Watanabe, and Atsuo Matsuoka

AN INVESTIGATION AND RESEARCH ON PREVALENCE OF MALIGNANT TUMOR IN LUNGS OF ICHIHARA CITIZENS. (Ichihara-shi jumin no hai akusei shucho hassei jokyo ni kansuru chosa kenkyu). Text in Japanese. In: Taiki osen oyobi suishitsu odaku no jintai ni ataeru eikyo chosa kenkyu (1971). (INVESTIGATION AND RESEARCH ON THE EFFECTS OF AIR AND WATER POLLUTION ON THE HUMAN BODY. (1971)) p. 13-18, June 1972.

Lung examinations were given to the citizens of Ichihara since 1958 for the purpose of grasping the pattern of carcinogenesis. The results of the 1971 examinations are reported. About 68.9% or 29,282 residents who do not receive regular health examinations either at the offices or schools were the objects of these examinations. The ratio were 34% males and 66% females, of which 58.3% were above 40 years old. Those who may have had an abnormality in the lungs were 1657 persons, or 5.66%, 88.5% of which were over 40. They were given a direct chest X-ray test. As a result, 32 patients were diagnosed as having a symptom which necessitated more detailed examinations. Twenty-one of them were female, and excepting one case, they were all above 40, and 18 cases were over 60. Thirteen of 22 cases were diagnosed as having the initial stages of lung cancer; three had tuberculosis; two had distended bronchi; one had a lung boil; one had pleural callus; and one had pneumonia. The percentage of suspected lung cancer cases was 0.21%, compared to 0.17% in the previous year. There has been a general increase in the discovery ratio since 1958.

26664 APTIC NO. 48310

Katsuki, Hideo, Shogei Watanabe, and Atsuo Matsuoka

CLINICAL AND EPIDEMIOLOGICAL STUDIES OF CHRONIC RESPIRATORY DISEASES OF ADULT INHABITANTS OF THE ICHIHARA AREA. (Ichihara chiku jumin (seijin) no mansei kokyuki shikkan no rinshoteki narabi ni ekigakuteki kenkyu). Text in Japanese. In: Taiki osen oyobi suishitsu odaku no jintai ni ataeru eikyo chosa kenkyu (1971). (INVESTIGATION AND RESEARCH ON THE EFFECTS OF AIR AND WATER POLLUTION ON THE HUMAN BODY. (1971)). p. 19-26, June 1972.

Citizens of Ichihara have been examined since 1970 to probe into the relationship between adult respiratory diseases and air pollution. In 1971, a total of 510 people, in groups of between 91 and 110, were examined to see the transition of lung fibrosis and emphysema according to age groups. Questionnaires, general clinical tests, lung function tests, and indirect chest X-ray examinations were given. Both lung fibrosis and emphysema images on the X-ray photos increased with the increase of age. Among the men and women in the same age group, fibrosis was more prevalent among women, but emphysema was more often found among men. The mesh-like shadows were examined; it was discovered that the infarction type increased with the age, and the mixed type of infarction and congestion was found among older people. The results of the lung function tests were compared between the 52 cases with emphysema shadows and 40 others with suspected emphysema. Thirty-three of 52 with emphysema shadows had normal lung function, 12 had infarction, two had congestion, and five had mixed type abnormalities. 35 cases of the 40 with suspected emphysema had normal lung function.

26665 APTIC NO. 48284

Kliment, V., J. Libich, and V. Kaudersova

GEOMETRY OF GUINEA PIG RESPIRATORY TRACT AND APPLICATION OF LANDAHL'S MODEL OF DEPOSITION OF AEROSOL PARTICLES. J. Hyg., Epidemiol., Microbiol., and Immunol. (Prague), 16(1):107-114, 1972. 9 refs.

The dimensions, number, and branching of the airways of the guinea pig respiratory tract were studied. Measurement was done in corrosive preparations obtained by injecting chloroprene latex diprene G into the lungs of experimental animals. The results on the geometry of the airways, along with the relevant references on respiration parameters, were used to calculate the deposition of aerosol particles in the lungs according to Landahl's model. The calculated values of the degree of retention in the pulmonary space were compared with the experimental results for an actual polydispersive aerosol. The architecture of the airways of the human and guinea respiratory tracts were evaluated, and possibilities for the application of this method were indicated, with special reference to inhalation infections. (Author summary)

26666 APTIC NO. 48132

Kobayashi, Masaki, Terumichi Sugita, and Masao Shishido

BASIC STUDIES ON THE MAXIMUM EXPIRATION QUANTITY OF YOUNG CHILDREN. (Yoji no saidai kokiryuryo ni kansuru kisoteki kenkyu). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):389, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

One hundred kindergarten children in Yokohama were given pulmonary function tests for 6 consecutive days in March 1972. Wright Peak Flowmeters for children were used for measuring maximum expiration quantities at 10 am and 12:30 pm, and the highest of three measurements taken at one time per child was used. The dates, times, and individual differences were examined by the dispersion analytical method. During the same period, the heights, weights, and chest measurements of the children were taken; significant correlation with the pulmonary function indexes were sought. Those with flue, sickness, or past records of bronchial asthma were excluded from the records, and finally the indexes of 33 boys and 23 girls were examined. The pulmonary function averages were higher among the boys, and 12:30 measurements were generally higher than 10 am measurements for both boys and girls. No daily fluctuation was noted for boys, but significant individual and time differences were noted. Significant differences appeared among girls for all items.

26667 APTIC NO. 48234

Koike, Shigeo, Yutaka Yamaguchi, Hideko Horiuchi, Kazuo Tsuchida, Atsushi Kimura, and Hiroyasu Ito

INVESTIGATION OF CONSCIOUS SYMPTOMS OF ELEMENTARY AND JUNIOR HIGH SCHOOL CHILDREN

IN TOKYO METROPOLITAN AREA WITH REFERENCE TO POLLUTION LOGS. (Kogai nisshi ni yoru Tokyo-to chu-shogakko seito no jikaku shojo chosa). Text in Japanese. Nippon Koshu Zasshi (Japan. J. Public Health), 19(10):392, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

Approximately 5000 pupils from the fourth grade to the third year in junior high school in the heavily polluted Kojiya district of Tokyo, approximately 3200 children from the relatively clean Den en-chofu district, and 3000 children from the Nerima district as a control group, kept daily pollution logs between Oct. 1 and 31, 1970 and Jan. 16 and Feb. 15, 1971 on 11 questions on general health conditions and 24 questions on conscious respiratory symptoms. The answers were compiled and examined per question. The greatest number of entries were found for the phenomenon of runny noses in the fall among Kojiya district children (3510 persons/day). Conscious symptoms answers were greatest in number in Kojiya, then Den en-chofu, then the control area. For all the question items, the greatest percent went to Kojiya, then Den en-chofu, and then to Nerima lastly. Sulfur dioxide concentration measurements on given dates with high symptom entries were also high. Many children in the Kojiya area with a past record of asthma complained of much coughing in the morning. Judging from the wheezing symptom complaints, 0.4 to 2.3% of the children had asthma.

26668 **APTIC NO. 48308**

Kubo, Masaji and Ryo Yoshida

HEALTH EXAMINATIONS OF INFANTS FROM 0-3 YEARS OLD IN ICHIHARA CITY. (Ichihara-shi 0-3 saiji kenshin). Text in Japanese. In: Taiki osen oyobi suishitsu odaku no jintai ni ataeru eikyo chosa kenkyu (1971). (INVESTIGATION AND RESEARCH ON THE EFFECTS OF AIR AND WATER POLLUTION ON THE HUMAN BODY. (1971)) p. 5-12, June 1972.

A total of 198 children from 0 to 3 years old were examined in Ichihara city and their health and morbidity were investigated. Questionnaires were given to the parents, and when considered necessary, cytological tests of sputum and phlegm, and bacteriological tests of the pharynx and sputum were given to the children. As a general tendency, a high number of small families lived in the polluted areas, and larger families lived in the control area. One-third of families residing in the polluted areas were skilled workers, simple laborers, and factory workers. In the control area, one-fourth of the families were engaged in agriculture. There was no significant difference in the family histories of the both areas. The ratios of various inoculations and vaccinations were satisfactory in both areas. The past health records showed no significant geographical differences. However, the morbidity of respiratory system diseases was significantly higher in the polluted areas: the total percentage of respiratory diseases per year was 10% in the polluted areas, and 1.6% in the control area. Other pediatric examinations showed no significant differences.

26669 **APTIC NO. 48334**

Kubo, Syogo, Atsushi Kinoshita, and Keiko Bando

SYMPTOMS PROBABLY CAUSED BY PHOTOCHEMICAL SMOG. (Kokagakusumoggu johoka ni shudan hassei shita kanjo no rinsho chiken). Text in Japanese. Nippon Gahka Kiyo (J. Japan Ophthalmol.), 23(7):554-568, 1972. 11 refs.

On Aug. 27 and Sept. 2, 1971, the southern district of Osaka experienced episodes of photochemical smog, during which 762 residents suffered from eye or throat irritation. Chest complaints, respiratory difficulties, sensations of paresis in the extremities, and mental disturbances were reported. Clinical findings in the 12 patients who were admitted to Sakai Municipal Hospital because of severe symptoms are presented. Nine patients showed a transient leucocytosis, and five showed a transient increase of hilar markings on chest X-rays. Physiological abnormal ophthalmologic findings were not present on admission. Eye irritation and other clinical aberrations disappeared within 24 hours. Sulfur dioxide, nitrogen dioxide, nitric oxide, peroxyacetyl nitrate, peroxybenzol nitrate, and hydrocarbon levels in the area are described. Wind direction was an important factor in the dispersion of pollutants.

26670 **APTIC NO. 48242**

Kumasiro, Kazuo, Sachiko Odagiri, Yutaka Nagao, and Kishio Asanuma

DETERMINATIONS OF MANGANESE IN THE URINE OF THE DWELLERS AT TAKASIMA AND SIONASU DISTRICT IN MIZUSHIMA INDUSTRIAL CITY, OKAYAMA PREFECTURE. (Mizushima rinkai kogyo chitai jumin no nyochu mangan no teiryo). Text in Japanese. Okayama-ken Eisei Kenkyusho Nenpo (Ann. Rept. Hyg. Lab. Okayama Prefect.), no. 19:18-19, 1972. 7 refs.

Recently, some inhabitants of Mizushima have complained of serious coughs and numbness of limbs, and the manganese compound in the dusts emitted from nearby factories was suspected as the cause. The measurement of the manganese content in the urine of the inhabitants was taken by the organic catalyst extraction method. A small amount of 5% ascorbic acid was added to 50 ml of urine; pH was adjusted to 7.5; 0.4% w/v kinofolm and a methyl isobutyl ketone solution were added to the urine; and an atomic absorption analysis was given. The specific weight correction was given to the manganese content. The inhabitants of the polluted area had an average of 0.43 + or 0.12 gamma/d l, and those in the control area had 0.43 + or 0.27 gamma/d l. The control group showed a slightly higher average, but the difference was not significant. The manganese content in the urine of a normal person is less than 1.0 gamma/d l and that in blood is 12 to 15 gamma/d l. The result seemed within the normal range; thus, Mn was not the cause of the complaints.

26671 **APTIC NO. 48401**

Litichevskiy, P. O., A. S. Skoropostizhnaya, and A. G. Myts

THE PROPHYLACTIC ROLE OF VITAMINS B1, B2 AND HALASCORBINE IN METHYLENE CHLORIDE INTOXICATION. (Profilakticheskaya rol vitaminov B1, B2 i galaskorbina pri intoksikatsii metilenkhloridom). Gigiena i Sanit., 37(2):113-114, Feb. 1972. 2 refs. Translated from Russian. 4p., 1972.

The amount of ascorbic acid (vitamin C) in the liver and adrenals of rats inoculated with methylene chloride to produce chronic intoxication was measured at specified intervals to determine the effects of vitamins B1, B2, and halascorbine added to the diet. All the animals were given 0.003 ml of methylene chloride daily and were put on a generally vivifying diet. The rats in the first group were given only methylene chloride with no additional vitamin supplement; the second group was given an additional 0.2 mg of vitamin B1; the third was given an additional 0.3 mg of vitamin B2; the fourth group was supplemented with 3 mg of halascorbine daily. The control group was fed the general diet and was not inoculated with methylene chloride. After a period of 1.5 months from the start, the ascorbic acid in the liver of group one was approximately half of that in the control group. The amount of ascorbic acid in the livers of groups two, three, and four increased. The introduction of supplemental vitamins to the diet, therefore, had a positive effect on the organism of the test animals in the first stage of intoxication.

26672 **APTIC NO. 47878**

Lob M., M. Guillemin, J. C. Murset, and I. Perelyguine

BLOOD LEAD, DELTA-AMINOLEVULINIC ACID AND DELTA-AMINOLEVULINIC ACID DEHYDRATASE. COMPARISON OF RESULTS BETWEEN URBAN AND

RURAL DWELLERS. (Plombemie, acide delta-aminolevulinique et dehydratase de l acide delta-aminolevulinique. Resultats compares entre ecoliers de la ville et de la campagne). Text in French. Schweiz. Med. Wochenschr. (Basel), 102(48):1751-1760, 1972. 52 refs.

Comparative tests of blood lead, delta-aminolevulinic acid, and delta-aminolevulinic acid dehydratase in two different groups of 14-15 year old schoolboys living in urban and secluded rural environments, respectively, are described. Significant differences between the two groups regarding all three parameters were found. The blood lead levels were 22.15 micrograms/100 ml in the urban group and 18.9 micrograms/100 ml in the rural group. The delta aminolevulinic acid levels in the two groups were in the respective ranges of 0.135-0.800 mg/100 ml and 0.080-0.620 mg/100 ml; the corresponding ranges for the delta-aminolevulinic dehydratase in the urban and rural groups were 17.0-34.3 units and 14.0-40.8 units. The blood lead content and delta-aminolevulinic acid values followed normal logarithmic distributions, while the distribution was independent of the quantities of lead absorbed. The lead-induced inhibition of the delta-aminolevulinic acid dehydratase, causing no clinical or hematological symptoms, may have been due to the blockade of active sulfhydral groups. The values for the delta-aminolevulinic acid dehydratase were distributed differently between the two populations.

26673 **APTIC NO. 48004**

McIntire, Matilda S. and Carol R. Angle

AIR LEAD: RELATION TO LEAD IN BLOOD OF BLACK SCHOOL CHILDREN DEFICIENT IN GLUCOSE-6-PHOSPHATE DEHYDROGENASE. Science, 177(4048):520-522, Aug. 11, 1972. 30 refs.

Forty-four black children at two elementary schools within 0.7 mi of a battery plant in Omaha had significantly higher (P less than .001) concentrations of lead in their blood (34.1 + or -9.7 micrograms/100 ml, mean + or deviation) than 122 students (26.3 + or 7.1) at seven schools 1-3 mi distant. Five months later there was a comparable difference between red cell lead values (54.1 + or 18.5 versus 37.4 + or - 12.6). Those blacks deficient in glucose-6-phosphate dehydrogenase had a higher (P less than .005) concentration of lead in the blood after correction for anemia (32.9 + or 9.7) than the nondeficient (25.7 + or 8.8), and a higher concentration in the red cells (47.3 + or 14.7 compared to 35.6 + or - 15.8, P less than .001); the enzyme effect was independent of geographic location. The apparent increase in blood lead in G-6-PD deficient blacks is of potential significance to 12% of black males and 1.4% of black females with this genetic variant, most of whom live in inner city areas with high ambient lead concentrations. The monthly average of air lead in Omaha was 1.69 + or 0.28 micrograms/cu m at a commercial site, 2.81 + or 1.04 at an industrial site, 1.48 + or 0.35 at a mixed commercial-residential site, and 0.79 + or 0.13 at a residential site. (Author abstract modified)

26674 **APTIC NO. 48213**

Miyaji, K.

YOKKAICHI ASTHMA. (Yokkaichi zensoku). Text in Japanese. Rinsho Seijinbyo (J. Adult Diseases), 2(5):543-549, May 1972. 7 refs.

Operation of a large petroleum complex in Yokkaichi has increased air pollution over the city. Asthmatic diseases have occurred in many neighboring villages as well as within the city. Sulfur dioxide and dust are spread to neighboring villages by seasonal wind. Higher stacks and better fuels have lowered the concentration of pollution, however the polluted area is increasing in size. Doctor's fees for patients suffering from air pollution-related diseases are paid for by the city because of a relief program. Sulfur dioxide, nitrogen dioxide, ammonia, hydrogen chloride, formaldehyde, and aliphatic aldehydes are the main pollutants, and paraffinic and olefinic hydrocarbons and derivatives of aldehydes, ketones, and alcohols are odorants. All of these pollutants are derived from the petroleum industry. Since the establishment of the relief system, 947 patients have received remuneration for doctors costs. Bronchial asthma, chronic bronchitis, asthmatic bronchitis, and pulmonary emphysma are the most prevalent diseases. Attack rates peaked in patients less than 11 and between 40 and 60 years old. Another 1500 patients exist who are eligible for relief, but who do not receive aid, in the most polluted area of Yokkaichi containing 100,000 inhabitants. Trends, relationships between disease and age, characteristics of Yokkaichi asthma, and the allergic basis of the asthma are discussed. The pollution leads to hypersensitivity of the bronchi to infection. Abuse of bronchodilators for therapy is a factor leading to increased mortality.

26675 **APTIC NO. 48294**

Mizoguchi, Isao, Kuniyoshi Makino, Yasuhito Sato, Masanobu Ohsawa, Midori Chigusa, and Hiroshi Yagyu

EXPERIMENTAL STUDIES ON EYE IRRITATION DUE TO PHOTOCHEMICAL SMOG. (Kokagaku sumoggu ni yoru ganshigeki sayo no jikkenteki kenkyu). Text in Japanese. Tokyo-Toritsu Eisei Kenkyusho Nenpo (Annu. Rept. Tokyo-to Lab. Med. Sci.), no. 23:309-313, 1972. 5 refs.

The role of photochemical smog in eye irritation mechanisms was examined in ultraviolet irradiation chamber experiments. Results were evaluated by statistical procedures to determine the effect of oxidant concentrations on eye irritation. Acrolein, formaldehyde, and ethyl nitrite were directly correlated with eye irritation; ozone was not correlated. The effect of auto exhaust at various engine cycles was examined. The effect of peroxyacetyl nitrate was also studied.

26676 **APTIC NO. 48250**

Nagumo, Kiyoshi

INVESTIGATION ON THE HEALTH OF HIRED AUTOMOBILE WORKERS (DRIVERS, SUPERVISORS, MECHANICS). REPORT NO. 1. (Takushi rodosha no kenko chosa). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):378, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

A questionnaire containing 50 questions was given to 4612 taxi drivers, 3357 hired car drivers, 445 instructors, 451 mechanics, and other workers related to automboiles (total 9242) between March and April 1971. Questions were asked on their awareness of coughs, sputum, the color of sputum, asthmatic conditions, the effects of weather, throat and nose symptoms, eye irritation, and the effects of exhaust gases. The questionnaire recovery rate was 90%. Most taxi drivers (51.2%) complained of sputum discharges; 32% of the taxi drivers, 25% of the hired car drivers, 23% of the instructors, 15% of the mechanics, and 8.2% others answered to chronic bronchial symptoms. These percentages are relatively high compared to ordinary inhabitants of polluted areas. Asthmatic conditions were complained of by 33% of taxi drivers, 24% of the hired car drivers, 25% of the instructors, 19% of the mechanics, and 16% of the others. Compared to a highly polluted area (Yokkaichi, for instance), asthmatic morbidity of taxi drivers is extremely high. In general, more people felt the effects of bad air rather than bad weather. Many taxi and hired car drivers and instructors complained of symptoms in the nose and throat. All answers showed their susceptibility to cold in winter and to eye irritation.

26677 **APTIC NO. 48211**

Nakagawa Y., M. Nagasaki, S. Niiho, R. Arihata, T. Kizuka, H. Yagyu, K. Akiyama, R. Takahashi, S. Nagashima, K. Fujiya, K. Ogasawara, S. Shimoda, and K. Bushimata

THE EFFECT ON THE HUMAN BODY OF LEAD POLLUTION-NO. 4-THE RESULT OF CLINICAL DIAGNOSIS IN TOKYO IN 1971. (Namari osen no jintaieikyo ni tsuite-No.4-Showa 46 nendo kenshinji no rinshokensa seiseki ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):418, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

When Tokyo was divided into commercial, industrial, and residential districts, the industrial district was the most polluted according to the measurement of lead content in blood and urine and aminolevulinic acid content in urine. The indexes for measurement of lead pollution were lead content in blood and urine and ALA content in urine; the indexes for air pollution were sulfur dioxide, carbon monoxide, and sedimentated dust content in air; and the indexes for social statistics were the density of cars, workers, population, and the death rate. The following indexes were related: indexes for measurement of lead; SO2 content in air and ALA content in urine; between SO2 and lead content in blood; between the density of cars and CO content in air; and between death rate and the density of cars.

26678 **APTIC NO. 48134**

Oda, Masami

MEASUREMENTS OF LUNG FUNCTIONS BY VI-TELLER IN URBAN COMMERCIAL- RESIDENTIAL AREAS, AND THE STANDARD INDEX. (Toshi shogyo jutakuchi ni okeru baitera ni yoru hai-kino sokuteichi oyobi sono kijunchi). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):387, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

Inhabitants of Yokohama city Isoko district were previously given an awareness survey on air pollution; the same people were given a pulmonary function test using a vi-teller. A total of 1390 people (660 male, 730 female) were given examinations. About 78% of the males and 15.7% of the females were smokers, and the average ages were 39.9 plus or minus 14.3 for males, and 41.9 plus minus 14 for females. The area's air pollution condition includes approximately 8 t/yr of settling particles and 0.03 ppm/yr average of sulfur dioxide. Chronic coughing and sputum discharges are common symptoms of 3.2% of men in their 40s in this district. The statistics showed that in general vital capacity was lower than the estimated figures by the Baldwin formula. This was probably caused by the difference of physical position at the time of examination and the mechanical differences between a vi-teller and a spirometer. The results are presented in a table, and formulas for vital capacity standard indexes by a vi-teller are presented.

26679 **APTIC NO. 47896**

Oshima, Hidehiko and Masayuki Imai

THE EFFECTS OF AIR POLLUTION IN YOKKAICHI ON HUMAN BODY. (Yokkaichi chiiki ni okeru taiki osen no jintai ni oyobosu eikyo ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):382, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

Questionnaires and medical examinations were given to citizens of Yokkaichi since 1961. The results were studied and the relationship between air pollution and congestive respiratory diseases was examined. In 1964, 9.4% chronic bronchitis and 26.5% asthmatic attack patients were found in highly polluted areas. In 1968, these figures decreased to 7.1% and 15.9%, respectively. In 1965 and 1966, 6.9% chronic bronchitis and 16.7% asthmatic patients were found in medium polluted areas, and in 1970 and 1971, these ratios were 7.0% and 14.0%, respectively. The ratios of these diseases in highly polluted areas seemed to decrease with years due to high stacks, but those in medium polluted and lightly polluted areas have been consistent. In earlier years, there was a strong correlation between sulfur dioxide gas concentration and bronchial asthma, but more recently, a 1% correlation is recognized between SO2 gas and chronic bronchitis and emphysema morbidities.

26680 **APTIC NO. 48317**

Oshima, Hidehiko, Masayuki Imai, and Tokiko Hawagishi

EFFECTS OF AIR POLLUTION ON THE RESPIRATORY SYMPTOMS IN YOKKAICHI. (Yokkaichi no okeru taiki osen no kokyuki shojo ni oyobosu eikyo ni tsuite). Text in Japanese. Mie Igaku (J. Med., Mie Prefect. Univ.), 16(1):25-29, June 1972. 10 refs.

In 10 districts of Yokkaichi, 26,823 inhabitants above 40 years of age were given the BMRC questionnaire. The frequency of cough and sputum lasting over 3 months ranged from 14.3 to 20.2%, those lasting less than 3 months ranged between 16.8 and 26.1% depending on districts. There was a clear relationship between the degree of pollution and the ratio of these conscious symptoms. In the total area, the number of chronic bronchitis patients was 556 and the number of bronchial asthma patients was 402, of which 171 had both diseases. The morbidity of chronic bronchitis among the smokers was 9.7% and among the non-smokers was 3.3%. The difference between male and female morbidities seemed to show the difference in smoking habits, rather than the difference in sex. The asthmatic attack frequency increased paralleling the degree of air pollution in these districts; so did the chronic bronchitis morbidity. In the total area, the number of asthmatic patients was 2306; the morbidity of males was 14.3%, females 11.5%. The asthmatic attack frequency was 15.8% among the smokers and 9.6% among the non-smokers.

26681 **APTIC NO. 47983**

Pujman, V., P. Schmidt, J. Somora, I. Pfeifer, J. Fiala, L. Viktora, and S. Cernochova

THE INFLUENCE OF SOME PECTICIDES AND POWERPLANT ASH ON SOME INDICATORS OF HAEMATOPOIESIS IN MICE. (Vliv nekterych pesticid a elektrarenskeho popilku na nektere ukazatele krvetvor y mysi). Text in Czech. Cesk. Hyg. (Prague), 17(2-3):64-69, 1972. 10 refs.

Groups of 10 mice of the H strain were administered with drinking water for a period of two weeks containing 500 micrograms of Dykol 50 (DDT), 100 micrograms Dykol 50, 10 micrograms Endrin 20, and 50 micrograms Endrin 20. Groups of 25 mice each of the HSPF strain drank a 0, 1, 5, and 10 per mille suspension of power plant fly ash for 29 days and groups of five rats each were subcutaneously injected for four consecutive days with solutions of 3 and 10 mg. Cyclophosphamide and erythrocytes, leucocytes, and reticulocytes were counted and femoral bone marrow smears were examined by standard methods in all treated groups. Erythropenia, neutropenia in peripheral blood, and intensification of erythropoiesis in femoral marrow was noted in mice administered both with Dykol 50 and Endrin 20. Mice administered with the fly ash suspension developed neutropenia, reticulocytopenia, intensification of erythropoiesis, and lowered erythrocyte resistance (shift of erythrogram). Rats injected with cyclophosphamide manifested a distinct drop of erythrocyte numbers, a statistically significant drop of leucocyte and neutriphil numbers and a slight intensification of erythropoiesis with fewer polychromatophile erythroblasts and orthochromatic erythroblasts. Intensification of erythropoiesis in the bone marrow of some animals is a non-specific reaction whose mechanism remains unresolved; it could be caused by a change in the maturation and decay of erythrocytes induced by the presence of a certain quantity of a foreign substance in the organism.

26682 **APTIC NO. 47907**

Rokushika, T. and M. Aoyama

THE MUTUAL RELATION BETWEEN AIR POLLUTION AND PHYSIQUE, PHYSICAL STRENGTH, AND SUBJECTIVE SYMPTOMS OF CHILDREN. (Taikiosen to

Jidoseito no taikaku, tairyoku, shuso tono kankei). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):459, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

Students of primary and secondary schools of polluted and non- polluted areas were studied. There was not much difference between the subjects of polluted area and the non-polluted area on height, weight, and the girth of the chest and on the ascent and descent movement of a step. In an endurance contest in running, secondary school students of the polluted area were inferior to the students of the non-polluted area. There did not exist the mutual relation between the ability of running and the subjective symptom in secondary school students. But at the primary school in the polluted area, children who were under average in ability of ascent and descent movement of a step showed symptoms of bronchitis and neurosis.

26683 **APTIC NO. 48236**

Sasaki, Tadamasa, Ikuo Yamamura, Mikio Kato, Yoshio Saito, and Yukiko Obata

PATIENTS DIAGNOSED AS VICTIMS OF AIR POLLUTION HEALTH IMPAIRMENT. (Taiki-kei kogaibyo nintei kanja ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):383, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

Statistical studies were made of the patients in seven cities (Kawasaki, Yokohama, Fuji, Yokkaichi, Osaka, Amagasaki, and Nagoya) who have been diagnosed as air pollution victims. Death occurred in 59.3 of 100,000 in Yokkaichi, 30 in Osaka, and 12.5 in Kawasaki; but mortality ratios are 7.4, 1.3, and 3.0 respectively. The ratios of asthmatic bronchitis were 51% in Osaka and Amagasaki, 46% in Nagoya, 15-6% in Kawasaki and Yokohama, and 22% in Yokkaichi. Asthmatic bronchitis was especially noted among infants from 3 months to 1 year old; but after they are 3 or 4 years old, they seemed to recover. The percentage of chronic bronchitis was greatest in Yokkaichi (40.6%). The ratios of bronchial asthma cases were 82.5% in Fuji, 64% in Yokohama, 58.1% in Kawasaki, and 36.4% in Yokkaichi. The percentages of emphysema ranged from 0.3% (Nagoya) to 8.4% (Kawasaki).

26684 **APTIC NO. 47909**

Shinozaki, Yoshitsugu

THE EFFECT ON THE LUNG FUNCTION OF INFANTS BY AIR POLLUTION DUE TO HYDROGEN CHLORIDE IN SHIBUKAWA CITY (GUNMA PREFECTURE). (Taikiosen to yoji no hai kinou). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):460, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

This city was divided into the factory district, city area, outskirts of the city, and suburbs. In the factory district which was the most polluted, the shorter the subject s height was, the lower was the value of peak flow. Vital capacity was less in the factory district and city area than in the outskirts of the city and suburbs. The percentage of the infants whose vital capacity was under M-6 was 26.2% in the factory district and 8.3% in the suburbs. Thus, the infants in the polluted area had a reduction of lung function.

26685 **APTIC NO. 48408**

Shtutman, Ts. M., V. P. Artyukh, A. A. Biber, and R. V. Chagovets

THE DYNAMICS OF METHIONINE METABOLISM, GLUTATHIONE CONTENT AND ATP-L-METHIONINE-S-ADENOSYLTRANSFERASE ACTIVITY IN RAT LIVER AFTER A SINGLE ADMINISTRATION OF SELENITE. (Dinamika izmenenii obmena metionina, soderzhaniya glyutationa i aktivnosti ATF-L-metionin- S-adenosyltransferazy v pechenii krys posle odnokratnogo vvedeniya selenita). Academy of Sciences, Ukrainian SSR), Kiev, Inst. of Biochemistry, 29 refs. Translated from Russian. 13p.

The effect of single injection of selenite (75 micrograms/100 g of weight) on the methionine metabolism in rat liver tissue was studied. Radioactive methionine-S35, glycine-C14, and leucine-C14 were administered two hours before decapitation of the animals. Selenium caused an increase in incorporation of methionine-S35 in liver tissue, reaching a maximum in the sixth hour. At this point all of the excess of incorporated methionine S35 was found in the protein-free fraction of the tissue as a component of glutathione. After 20 and 48 hours, the increased incorporation 0of methionine-S35 continued but was found in the protein fraction. By the sixth hour, the activity of ATP-L- methionine-S-adenosyltransferase increased, a maximum glutathione content was reached, and glycine-1- and -2-C14 were incorporated into it. The increased incorporation of methionine-S35 into the liver tissue protein fraction after 20 hours was confirmed by experiments with leucine-C14.

26686 **APTIC NO. 48400**

Smolyar, V. I.

MICROELEMENT REQUIREMENTS OF CHILDREN AND ADULTS. (O potrebnosti detey i vzroslykh v mikroelementakh). Gigiena i Sanit., 37(3):86-89, March 1972. 14 refs. Translated from Russian. 6p., 1972.

The microelement requirements of children and adults are examined. In healthy persons, there is a balance between in-take and excretion; with the addition of any microelement to the daily diet, its excretion increases and in 3-4 days it is balanced. With a deficiency of any necessary microelement, which is known to lead to the development of various diseases, retention of that microelement is prolonged and balance established only after 2-3 weeks. In studying microelement requirements, seasonal and zonal variations in actual diets, the ratios of the elements, the physiological characteristics of individuals age, sex, physical development, hematological patterns, degree of adaptation of the organism to their level, and the geochemical conditions of the environment must be examined. Daily requirements are examined for copper, manganese, molybdenum, zinc, and cobalt.

26687 **APTIC NO. 48091**

Stewart, Richard D., Terrance N. Fisher, Michael J. Hosko, Jack E. Peterson, Edward D. Baretta, and Hugh C. Dodd

EXPERIMENTAL HUMAN EXPOSURE TO METHYLENE CHLORIDE. Arch. Environ. Health, 25(5):342-348, Nov. 1972. 9 refs.

Four experimental exposures to known concentrations of methylene chloride were conducted in an exposure chamber on 11 males aged 23-43 yrs. Inhalation of methylene chloride vapor in concentrations of 500-1000 ppm for 1-2 hr was followed promptly by a sustained elevation of carboxyhemoglobin levels. Carbon monoxide may be a metabolite of methylene chloride; thus, exposure to concentrations of methylene chloride that do not exceed the industrial threshold limit value may result in carboxyhemoglobin saturation in excess of that allowable from CO itself. Methylene chloride also produced signs and symptoms of central nervous system depression in subjects exposed to concentrations of 1000 ppm. Because methylene chloride is used in paint removers, a large number of persons in the nonindustrial environment, including the elderly and those with significant cardiovascular disease, may be subjected unknowingly to the anoxic effects of CO. (Author abstract modified)

26688 **APTIC NO. 47895**

Sugita, Kido and Masao Shishido

FACT-FINDING OF PHOTOCHEMICAL AIR POLLUTION. (Kokagaku kogai no jittai). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 71. (Nov. 7-9, Paper 19.)

The extent of health damages by photochemical smog that occurred in Kanagawa last year, and their relationships with the meteorological factors were studied. The pollutants examined were sulfur dioxide, dusts, nitric oxide, nitrogen dioxide, total hydrocarbons, and oxidant; the wind velocity, temperature, humidity, and the wind direction were investigated by the hour for three consecutive days with the days of smogs in the middle. Most of health damages occurred between 10 am and 4 pm. In Kawasaki city, both oxidant and SO2 concentration were high at the time of smog health damages, but when the SO2 concentration was low, the number of victims was small.

26689 **APTIC NO. 48217**

Suzuki, T. and Y. T kimoto

STUDY ON THE EFFECT OF A VERY SMALL QUANTITY OF LEAD IN AIR. (Taikichu biryonamari no eikyo ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):419, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

Inhabitants of a town where there were few factories and the average volume of traffic was 2300 cars/hr were studied. The lead content in the air was 1-2 micrograms/cu m in a shopping district, 0.1-1 micrograms/cu m in a residential district, and 0.0-2 micrograms/cu m in an agricultural district. The subjects were over 30 years old and 90% of them had been living in this town over 10 years. The concentration of lead, aminolevulinic acid content in urine, activity of aminolevulinic acid dehydratase, and the concentration of coproporphyrin in urine were examined. The subjects who were living in a shopping district or in an area where traffic was heavy were affected by inhalation of lead. About 20% of the subjects were worried about the effect of exhaust gas on human body, and about 33% of subjects were worried about the effect of lead. Eye irritation was also measured.

26690 **APTIC NO. 48320**

Suzuki, Takao

AIR POLLUTION AND HEALTH IMPAIRMENT IN IBARAJIMA DISTRICT OF AKITA CITY. (Akita-shi Ibarajima chiku no taiki osen to kenko shogai). Text in Japanese. Akita-ken Ishikai Zasshi (Akita Med. J.), 24(2):57-66, Sept. 1972. 8 refs.

In the heavily polluted Ibarajima district of Akita City, a continous monitoring, automatic recorder was installed in Oct. 1970. The sulfur dioxide content in the air was monitored. Health examinations of the citizens were conducted by the Akita Prefectural Government, Akita Medical Association, Akita Health Center, and the municipal government. Questionnaires were given to 3807 inhabitants of polluted districts with regard to their consciousness of air pollution and complaints. Health examinations were given by specialists in internal medicine, pediatrics, oto-rhino-laryngology, and ophthalmology. Of the 465 patients examined by internal or pediatric examinations, five bronchial asthma, five asthmatic bronchitis, seven congestive bronchitis, 18 chronic bronchitis, two emphysema, and three acute bronchitis cases were found. In the oto-rhino-laryngological examinations, a high rate of rhinitis and laryngitis were discovered in the heavily polluted Ibarajima area. Examinations in other departments did not show clear-cut pictures due to the small number of people who received examinations; but it was ascertained that some form of health impairment always existed in the areas with a high rate of air pollution.

26691 **APTIC NO. 48212**

Takano, Susumu, Takehiko Yamamoto, Toshiro Ikayasu, Fumie Hoshino, Mikio Yamamoto, Seiji Naito, Kenji Fuchimoto, Tomi Yoshino, Hidehiko Mitsunaga, and Mitsuru Hakojima

AN OBSERVATION OF RESPIRATORY FUNCTIONS OF CHILDREN TRANSFERRED FROM THE COAL REGIONS OF HOKKAIDO -- CASES OF ICHIHARA CITY. (Hokkaido santan chiiki yori tennyugaku shite kita gakudo no shutoshite kanki kino ni kansuru kosatsu -- Ichihara-shi no baai). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):391, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

It has been noted that many school children in Ichihara City have come from the coal regions of Hokkaido when their fathers left their jobs as coal mine workers. Examinations of the respiratory systems of these children were conducted to see if they were affected by the heavy pollution of the Ichihara area, in order to help form a policy for health care of the transferred children from other areas. The report consists of findings of July and Dec. 1971 and Feb. 1972. Vital capacity, total vital capacity, forced expiratory volume 1.0% and maximum ventilatory volume indexes were compared. In all examinations, no significant differences were recognized. In general, pulmonary ventilation of the transferred children was better. There was a clear sign that younger children had not adjusted to the drastic changes in social and geographical environments. However, generally, transferred children showed more stable indexes than native Ichihara children.

26692 **APTIC NO. 47905**

Takizawa, Y., I. Ogima, S. Kuroda, and T. Oshina

THE EFFECT ON THE HUMAN BODY BY FLUORIDE AIR POLLUTION. (Fukkabutsu ni yoru taikiosen no juntai no oyobosu eikyo). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):425, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

Subjects were 1210 children aged between 3 and 15 and 1147 subjects out of 1210 who were living in an area within 1 km of an aluminium refinery factory; 63 were chosen for comparison. The average fluoride content in urine of the subjects of the comparison group was 0.180 ppm and the subjects of the polluted area showed a remarkably high value of fluoride. As a result of the second examination, curvature of the ulna, early choosing of epiphysia line were found 9.3% of subjects, pulmonary fibrosis was found 4.1% of subjects, bronchitis was 9.7% and asthma was 3.2%. Twenty-four subjects were hynoplastic dental enamel.

26693 **APTIC NO. 48126**

Tepper, Lloyd B.

A SURVEY OF AIR AND POPULATION LEAD LEVELS IN SELECTED AMERICAN COMMUNITIES. A SUMMARY. Preprint, American Medical Assoc., Chicago, Ill., 7p., 1972. (Presented at the Air Pollution Medical Research Conference, Chicago Ill., Oct. 2-3, 1972.)

Under combined Federal, state, and industrial auspices, measurements of air and population lead levels were obtained during a 12-month period in 1961-1962 in Cincinnati, Los Angeles, and Philadelphia. An investigation was undertaken to determine whether or not a change in the concentration of airborne lead had occurred after an interval of 8 years, at a series of reference locations used in 1961-1962. It was also undertaken to determine the ambient atmospheric levels of lead at selected additional sites in the cities studied in 1961-1962 and in other communities, as well as to examine the extent to which levels of lead in the blood of selected population groups reflected exposure to lead at various levels in community atmospheres. In addition to the original cities, samples were collected in

Chicago, New York City, Houston, Washington, D. C., and Los Alamos. As anticipated, higher lead levels were associated with increasing urbanization, but a statistical examination of the association between blood concentration of lead and air concentrations of lead does not show the association to be significant. On the other hand, if one examines the blood levels in suburban and urban populations living in a given metropolitan area, the latter seems to exceed the former.

26694 **APTIC NO. 48233**

Tomita, Kinuko Toshio Kawaraya, Takesuke Haruki, and Tomoo Okami

THE RATE OF SELF-CONSCIOUS FATIGUE COMPLAINED BY PATROLMEN-BY CLASSIFICATION OF DUTIES. (Gaikin keisatsukan no shokushubetsu ni mita hirokan jikakushojo uttae-ritsu ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):379, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

Thirty traffic policewomen, 29 traffic police, 106 police task force members, and 50 patrol men, and as a control group, 80 clerical policemen were examined on their conscious symptoms of fatigue during fall and winter of 1970-71. Sleepiness, local maladjusted feelings, and difficulty of concentration were complained of by all in that order; the highest rate of complaints came from the task force members; the lowest rate came from office workers. Mostly these symptoms appeared after working hours. From 50 to 75% of the complaints were for eye irritation, shoulder pains, and dry mouths. General fatigue and psychological fatigue were complained of by patrolmen and office workers, and specific pains and clinical symptoms were complained by traffic policemen and women.

26695 **APTIC NO. 47906**

Tsuji, Y., H. Kanida, Y. Honma, I. Watanabe, and K. Matsuura

RELATION BETWEEN AIR POLLUTION DUE TO FLUORIDE AND SWELLING OF THE THYROID GLAND IN KITAKATA CITY (FUKUSHIMA PREFECTURE). (Fukkabutsu niyoru kankyoosen to kojosen shucho). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):426, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

There is an aluminum refinery factory in Kitakata. This city was divided into several sections. The area nearest to the factory was the most polluted area (fluoride content in air was 173.6 + or 242 kg/sq m/mo). Subjects were primary school children of this polluted area. The result was that 193 children out of 339 showed symptoms of swelling of the thyroid gland. But this result doesn't mean the mutual relation between air pollution due to fluoride and swelling of the thyroid gland because even in an area which was not polluted by fluoride, there sometimes were examples of swelling of the thyroid gland. More examinations on this subject are required.

26696 **APTIC NO. 48133**

Tsunetoshi, Yoshizo, Tadahiko Shimizu, Miyoko Ueda, Noriko Nakayama, Yasuyo Yamagata, Minoru Tsuda, Yasuhiro Takemura, Tomoichi Okumura, and Akiko Sakamoto

AN EXAMINATION OF INVESTIGATION METHODS FOR CHRONIC BRONCHITIS-- EXAMINATION OF SPUTUM. (Mansei kikanshien chosa hoho no kento-- kattan kensa ni tsuite). Text in Japanese. Nippon koshu Eisei Zasshi (Japan. J. Public Health), 19(10):388, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

As a part of an epidemiological study of chronic bronchitis, examinations were given to the sputum obtained within an hour after patients left their beds. Visual observation and viscosity tests were given. The ratio of sputum discharge was 88.8% among those patients who had complained of conscious chronic bronchitis symptoms in a questionnaire. Visual viscosity and mycopusity showed no significant difference between chronic bronchitis patients and normal bronchitis patients. The amount of discharge was greater among the chronic bronchitis patients; and the congestivity of sputum was also greater in this group.

26697 **APTIC NO. 48316**

Tsunetoshi, Yoshizo

EPIDEMIOLOGY OF CHRONIC BRONCHITIS. (Ekigaku mansei Kikanshien). Text in Japanese. Medicina (Medicine) (Japan), 9(12):2168-2169, Nov. 1972. 4 refs.

The relationship between the morbidity of chronic bronchitis patients and their ages and smoking rate can be expressed in an equation. The morbidity also increases with an increase of sulfur dioxide concentration in the atmosphere. The relationship between air pollution and morbidity is 1.94 (SO2 concentration) plus 0.71. In other words, with an increase of 1 mg/day/100 sq cm, the morbidity of chronic bronchitis patients increases 2%. From the records of the nonpolluted areas of Yokkaichi and Ako, it is known that the morbidity in areas with less than 1 mg/day/100 sq cm remains at the same level. The mortality of chronic bronchitis patients is high, and the gap between the mortality of normal person and that of bronchitis patients expands with the accumulation of data. The mortality of respiratory disease patients, especially, is high and 5.6 times over that of normal persons.

26698 **APTIC NO. 48318**

Ueda, Gou

THE EFFECTS OF ENVIRONMENT OF THE LIVING BODY. (Kankyo no seitai e no sayo ni tsuite). Text in Japanese. Gendai Iryo (Mod. Med. Treat.), 4(12):1256-1258, Dec. 1972. 18 refs.

A theoretical and mathematical analysis of the environmental effects on humans is briefly discussed. The method of expressing environmental conditions by equations, parameters in the environmental structure, individual reactions to the environmental parameters, and the hereditary variability of individuals in a given environment is discussed in general and theoretical terms.

26699 **APTIC NO. 48093**

Ury, Hans K., Norman M. Perkins, and John R. Goldsmith

MOTOR VEHICLE ACCIDENTS AND VEHICULAR POLLUTION IN LOS ANGELES. Arch. Environ. Health, 25(5):314-322, Nov. 1972. 7 refs.

A statistical method was used to compare Los Angeles motor vehicle accident (MVA) frequencies with the levels of two air pollutants, oxidants (OX) and carbon monoxide (CO), during two high OX and two high CO periods. Statistically significant association (P less than .0001) was found for OX and MVA, but no association was found between CO and MVA. Thus, increasing OX levels were frequently accompanied by an increase in the frequency of MVA, while MVA frequencies remained essentially unchanged when CO levels increased. Lag studies of 1-3 hr showed decrea[illegible] OX-MVA association and continuing nonassociation for CO and MVA. Possible pitfalls in the study are discussed. Most potential confounding factors were eliminated or minimized by statistical design, but smoking, spatial factors, and other pollutants should be considered in future investigations. (Author abstract modified)

26700 **APTIC NO. 48083**

Weiss, D., B. Whitten, and D. Leddy

LEAD CONTENT OF HUMAN HAIR (1871-1971). Science, 178(4056): 69-70, Oct. 6, 1972. 16 refs.

The lead content of human hair removed from persons between 1871 and 1923 was compared with hair obtained in 1971. The lead content per unit weight of hair was significantly higher in the antique population (1871-1923) than in present day populations. Thus, the lead content in human hair has markedly decreased in the last 50 years in spite of a general increase in atmospheric lead concentrations. The findings point out that widespread exposure hazards existed into the early part of this century due to the collection of water from lead roofing, the use of lead jugs and improperly glazed earthenware, leaded paints, and leaded cosmetics. No significant differences in the lead content of hair between populations of children from Philadelphia (an urban area) and from Michigan's western Upper Peninsula (rural area) were found. Lower lead was found in adult hair compared with that of children due to the higher metabolic level in children and the fact that absorption decreases with age.

26701 **APTIC NO. 48138**

Yamanouchi, Toru, Yoshito Tsuji, and Fumio Tsunoda

THE EFFECTS OF AIR POLLUTION IN A NEW INDUSTRIAL CITY IN FUKUSHIMA PREFECTURE ON THE HEALTH OF CITIZENS. (Fukushima-ken bo shin sangyo toshi ni okeru taiki osen ga jumin no kenko ni oyobosu eikyo ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):381, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

A newly developed inorganic chemical industry in Koriyama City, Fukushima Prefecture has created some air pollution problems in the area. Inhabitants of three districts adjacent to the factories (6947 people), and of a control residential area (2465 people) were examined on conscious symptoms in respiratory and neurological-sensory systems. Screened people were given BMRC questionnaires and lung function examinations. Among the males who have lived in the test area for more than 10 years, a particularly high percentage of coughing and sputum symptoms were noted. For light cases of asthmatic condition, there was a significant difference between the test and control areas, but the difference was not clear among more serious asthmatic patients. Eye irritation, headache, and discomfort showed significant differences between test and control areas. There was a tendency for higher morbidity among males for respiratory diseases, and among females for neurological diseases.

26702 **APTIC NO. 47908**

Yoshida, R., K. Motomiya, M. Adachi, K. Ito, M. Matsumura, K. Hayashi, M. Gen, M. Kubo, and S. Funabashi

THE RELATION BETWEEN AIR POLLUTION AND BRONCHIAL ASTHMA. (Chibaken-ka 12 shogakko ni okeru kikanshi zensoku yubyoritsu chosa seiseki). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):461, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

Students of a primary school in the Keiyo Industrial district were divided into two groups, namely, the polluted group and the comparison group according to the concentration of sulfur oxides in the air of their schools. The subjects who showed the symptoms of bronchial asthma were 2.45% of the polluted group and 1.06% of the control group. The subjects who were supposed to have bronchial asthma were 0.3% of the polluted group and 0.08% of the control group. There was the mutual relationship between the concentration of sulfur oxides and the morbidity rate of bronchial asthma.

26703 **APTIC NO. 48135**

Yoshida, Ryo, Takeshi Motomiya, Motoaki Adachi, Kozo Ito, and Akiko Kosaku

AN INVESTIGATION ON THE MORBIDITY OF RESPIRATORY ORGANS IN FUJI CITY, SHIZUOKA PREFECTURE. (Shizuoka-ken Fuji-shi ni okeru kokyuki shojo yushoritsu chosa ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):386, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

Respiratory morbidity tests were given by the BMRC method to city employees of Fuji city who were older than 40 years of age. Six hundred people were chosen from 8002 inhabitants of 45 districts. Answers were obtained from 548 (91.3%). About 75.1% of the males and 10.3% of the females were presently smokers; and 9.3% of men and 1.4% of women were former smokers. Morbidity was higher among men than women; but there was no indication that older people had a higher morbidity. Sputum discharge and cough continuing for more than three months for 7.4% of men and 9.5% of women. These figures were rather high compared to the records in the Kawasaki area. When morbidity of men of 40 years old or higher were compared with those in Kawasaki, Kashima, and Isiko, the figures in almost in all items were higher among the people of Fuji. The general public of Fuji city was very much influenced by air pollution.

26704 **APTIC NO. 48246**

Yoshida, R., K. Hayashi, A. Furusaku, K. Ishikawa, H. Hirano, F. Munakata, and K. Nagai

THE MEDICAL EXAMINATION OF INHABITANTS WITH REGARD TO POLLUTION BY LEAD. (I) THE RESULT OF A GENERAL EXAMINATION. (Namari osen o chushin toshita chiikijumin no kenko chosa. (I) Ippan kenshin kekka ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):416, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

The situation of Funabashi city in Chiba Prefecture was that factory stack gas contained over 80 mg/cu m of lead and the concentration of lead in air of this area was 0.07-3.50 micrograms/cu m. The subjects were 672 of men and women who were living within 800 m of the factory. As a result of the measurement of hemoglobin in blood, hypochrome anemia was found in 50% of the subjects. But the concentration of lead in blood and urine, aminolevulinic acid content in urine and aminolevulinic acid dehydratase content in blood of the subjects whose MCHC was under 31% and whose hemoglobin weight was under 12.0 g/dl (men) or 10.0 g/dl (women) didn't show the difference in comparison with those of subjects who were not hypochrome anemia. Therefore, the anemia had no connection with lead. The subjects who contained large amounts of lead in blood complained of fatigue, deterioration of physical strength, and stiff shoulders.

26705 **APTIC NO. 48313**

Yoshida, Ryo and Masaji Kubo

AN INVESTIGATION OF BRONCHIAL ASTHMA MORBIDITY OF THE CHILDREN IN THIRTEEN ELEMENTARY SCHOOLS IN CHIBA PREFECTURE. (Chiba-ken ka 13 shogakko gakudo no kikan a zensoku hindo chosa). Text in Japanese. In: Taiki osen oyobi suishitsu odaku no jintai ni ataeru eikyo chosa kenkyu (1971). (INVESTIGATION AND RESEARCH ON THE EFFECTS OF AIR AND WATER POLLUTION ON THE HUMAN BODY. (1971)). p. 85-133, June 1972.

A total of 10,103 children in 13 schools in Chiba Prefecture were given health examinations. The primary examination was given by a questionnaire to the family between Nov. and Dec. 1971, and only those who reached a certain screening level were given a physical examination by pediatricians between Jan. and Feb. 1972. The screening was determined by the level of sneezing, breathing difficulty, and asthmatic attacks. Of the total class levels, 2.4 to 11.2% of the boys, and zero to 10.6% of the girls were given the secondary examinations. In the areas with heavy air pollution, the morbidity of asthmatic children for both boys and girls was higher than 2.5%. In one school in Chiba city, the boys morbidity was 5.1%, and that of the girls was 3.0%; in another school in Ichikawa city, 4.1% for boys and 2.5% for girls were found. The number of the children with recurring bronchitis was significantly higher in polluted areas than non-polluted areas. Although the causes for bronchial asthma are complex and air pollution cannot be attributed as the single cause for it, prolonged illness and asthmatic attacks are undeniably caused by air pollution. The results of examinations are presented in tables.

26706 **APTIC NO. 47950**

Yotakis, Leonidas

THE PATHOGENICITY AND PHYSICO-CHEMICAL NATURE OF FLY ASH AND ITS CHANGES THROUGH ELECTRIC PRECIPITATION. (Die Pathogenitaet und physikochemische Natur von Flugasche und deren Veraenderung durch Elektrofilter). Text in German. Beitr. Silikose. Forsch. (Pneumokoniose), 24(3):55-79, 1972. 20 refs.

The fly ash from power plants was subjected to electrostatic precipitation at a voltage of 30 kV for determination of its properties and its pathogenic effect. The chemical analyses of the dusts were performed after drying at 105 C, based on the solubility of the products in 5% hydrochloric acid. The primary dust was corrosive. All dusts contained aluminum oxide, ferric carbonate, and silicon dioxide. A very minor fraction of the Al203 and the 3% quartz were the only crystalline bodies. The residual matter was composed of amorphous substances. The electrostatically precipitated dust contained a lower amount of iron. The fraction of 5-micron or less particles was relatively high. The mice were exposed, individually and in groups, to all of these dusts. A control group of mice inhaled clean air. Inhalation of the dust-laden air led to a halt of weight increases, increased the water consumption, as well as the inhalation rhythm and reduced the food intake. The silicotic myelinosis of a characteristic very limited fibrosis is proof of the pathogenicity of all dusts involved.

1971

26707 **APTIC NO. 48066**

Deutsches Zentralinstitut fuer Arbeitsmedizin, Berlin (East Germany)

INDUSTRIAL TOXICOLOGY PART I: ACIDS AND BASES. (Industrietoxikologie I: Saeuren und Laugen). Text in German. In: Arbeitswissenschaftliche Lehrbriefe. Rept. 14/15/16, p. 64-86, 1971 (?).

Health damages due to acids, bases, and to gaseous emissions from burning plastic materials are described. Acids cause coagulative necrosis of the skin and the mucosa, while their systemic action is largely dependent on the toxicity of the intact acid molecules, and, in some cases, also on that of the anion. Bases cause colliquative necrosis of the skin and the mucosa, alkalosis, vomiting, headache, and dizziness. The systemic action manifests itself in convulsions due to the deionization of the blood calcium, in kidney affections with anuria, and in alkalotic coma in serious cases. Bases are hardly neutralized by tissues. Polytetrafluoroethylene, releasing hexafluoroethane in a temperature range of 300-360 C, is the plastic with the most dangerous pyrolysis products. Also gases from burning polyurethane foams are toxic, while those from burning polyvinyl chloride and polyamides are less toxic, nevertheless irritant.

26708 **APTIC NO. 48068**

Deutsches Zentralinstitut fuer Arbeitsmedizin, Berlin (East Germany)

INDUSTRIAL TOXICOLOGY PART II: TOXIC GASES. (Industrietoxikologie II: Toxische Gase). Text in German. In: Arbeitswissenschaftliche Lehrbriefe. Rept. 14/15/16, p. 87-97, 1971 (?).

General toxicological description is given of the most common industrial toxic gases. Gases such as fluorine, chlorine, bromine, and their compounds, as well as phosgene, sulfur dioxide, nitrogen oxides, and ammonia have predominantly irritating effects, while others, such as carbon monoxide, carbon dioxide, acetylene, ethylene oxide, metal carbonyls, hydrocyanic acid, hydrogen sulfide, and hydrogen selenide interfere with metabolic processes. Pulmonary edema, fibrosis, bronchopneumonia, and ocular conjunctivitis are the symptoms of fluorine and hydrofluoric acid. Phosgene, decomposing into hydrochloric acid and CO, damages certain organs, the central nervous system, and interferes with enzymatic processes. Sulfur dioxide causes irritation of the respiratory tract, cough, vomiting, and pulmonary edema. Nitrogen ozides irritate moist mucosa, and cause pulmonary edema, dyspnea, vomiting, asthenia, unconsciousness, and possibly death or pulmonary complications. Ammonia represents a strong irritant for the mucosa, particularly of the eyes. Carbon monoxide, blocking hemoglobin, causes headache at carboxyhemoglobin contents above 25%, and psychic damages at contents of 30-50%, 75-80% concentration is lethal. Damages to the cardiovascular and vegetative nervous systems, and impaired vision and hearing due to chronic poisoning, have been observed. High concentrations of carbon dioxide cause headache, dizziness, asthenia, and damage to the central nervous system. Nausea, vomiting, and narcosis are the basic symptoms of poisonings with ethylene oxide. Hydrogen sulfide and hydrogen selenide irritate moist mucosa, damage enzyme systems, and may cause sudden death. Hydrocyanic acid interferes with the oxygen metabolism in the cells.

26709 **APTIC NO. 48333**

Knagge-Ruhe, B., W. Stecher, and H. J. Einbrodt

CHANGES IN THE LUNG IN WORKERS RESULTING FROM LEAD ORE AND LEAD EXPOSURE. (Lungenveraenderungen bei Arbeitern nach Bleierz- und Bleiexposition). Text in German. Beitr. Silikose-Forsch. (Bochum), 23(3):155-171, 1971. 18 refs.

The lead content in the lymph nodes or lungs of six men exposed to lead in occupational environments was determined, in addition to radiologic changes in the lung. Coal miners had levels of lead in their lungs considerably exceeding the norm. One lead miner had lead levels much higher than normal. In one case where an abnormally high amount of lead was found, there was also enough silicon dioxide measured to produce severe silicosis. It was not possible to show that lead in addition to SiO_2 had participated in producing fibrous processes in the lungs.

EFFECTS-PLANTS AND LIVESTOCK

1972

26710 **APTIC NO. 47880**

HOW TO RECOGNIZE AND CORRECT SULFUR DEFICIENCIES IN CROPS. Agr. Chem., 27(10):8-10, Oct. 1972.

Plants suffering from severe sulfur deficiency are small and spindly with short, slender stalks. Their growth rate is retarded and maturity is often delayed. On legumes, nodulation is frequently reduced. Young leaves are light green to yellowish in color. Reasons for the sulfur deficiencies being found in crops include the increasing switch to low sulfur fuels and the emphasis on air pollution control, less use of the superphosphate fertilizers, and the tendency to no longer spread large quantities of manure on crop lands. Once a soil deficiency has been determined, the logical question is one of determining the application rate needed to correct the problem. Recommendations are made for appropriate phosphoric pentoxide and sulfur ratios. Appropriate quantities of nitrogen, phosphoric pentoxide, potassium monoxide, and sulfur in a number of plants are listed.

26711 **APTIC NO. 48140**

Bielig, H. J., Sabine Bolstorff, and H. Treptow

THE INFLUENCE OF PROCESSING ON THE HEAVY METAL CONTENT IN FRUIT AND VEGETABLE PRODUCTS. I. THE LEAD CONTAMINATION OF APPLES AND THE RESIDUAL LEAD IN CLEAR APPLE JUICE. (Einfluss der Verarbeitung auf den Schwermetallgehalt in Frucht- und Gemueseprodukten. I. Mitteilung: Die Bleikontamination in Aepfeln und der Verbleib des Bleis bei der Herstellung von klarem Apfelsaft). Text in German. Deut. Lebensm. Rundsch., 68(9):277-280, 1972. 11 refs.

Because of its toxic effect and in view of the increasing pollution of the environment by lead-containing exhaust gases from Otto engines, the lead concentration of food has become of great interest. For this reason the lead content in 24 samples of apples of different origins and varieties was determined. An average value of 0.266 ppm lead was found, showing a variation of 0.05 to 0.61 ppm. Lead was more concentrated in the peel than in pulp. It could be partly removed by rinsing with water, which can be important for apple juice production. During apple juice production, a significant amount of lead goes with the pomace, depending on the yield of juice; a small lead content in turbid juice is due to diminished pressing. Furthermore, the lead content is reduced by enzymatic clarification and fining.

26712 **APTIC NO. 47884**

Boertitz, Siegfried and Michael Vogl

STUDIES OF INDIVIDUAL SMOKE RESISTANCE OF SPRUCE IN THE UPPER ERZGEBIRGE (GDR) BY PHYSIOLOGICAL MEASURINGS. (Gaswechselphysiologische Untersuchungen im oberen Erzebirge zur individuellen Rauchjaerte der Fichte). Text in German. Biol. Zentralbl., 91(4):437-441, 1972. 10 refs.

Net assimilation and transpiration of spruces of different phenotypical smoke resistance and the sulfur dioxide content of the air were registered in the upper Erzgebirge of East Germany with the aid of a physiological laboratory. The measurements were taken Sept. 1966 and Oct. 1968. The SO2 emissions were more frequent in Oct. 1968. The needles of very damaged spruces (with fewer needles), compared with those of the more vital trees, showed a gas exchange of higher intensity in periods with no or little emission, but of lower intensity during emission periods. This mechanism enhanced, rather than prevented, the loss of needles.

26713 **APTIC NO. 48112**

Botkin, Daniel B., William H. Smith, Roger W. Carlson, and Thomas L. Smith

EFFECTS OF OZONE ON WHITE PINE SAPLINGS: VARIATION IN INHIBITION AND RECOVERY OF NET PHOTOSYNTHESIS. Environ. Pollut., 3(4):273-289, Oct. 1972. 24 refs.

Net photosynthesis of white pine saplings collected from suburban nurseries and exposed to ozone was monitored over extended periods. The threshold of ozone suppression was approximately 50 pphm for a minimum of 4 hr. Above this threshold, three categories of ozone sensitivity were detected, i.e., susceptible, intermediate, and resistant. In intermediate trees, suppression was reversible if an ozone-free recovery period was made possible. Visible symptom expression on the foliage of the current year was not a good index of the timing or the severity of ozone-induced photosynthetic supression. (Author abstract modified)

26714 **APTIC NO. 48266**

Cathey, Henry M. and Howard E. Heggestad

REDUCTION OF OZONE DAMAGE TO PETUNIA HYBRIDA VILM. BY USE OF GROWTH REGULATING CHEMICALS AND TOLERANT CULTIVARS. J. Amer. Soc. Hort. Sci., 97(6):695-700, Nov. 1972. 30 refs.

Sixty-five cultivars of petunia, Petunia hybrida Vilm., were evaluated for sensitivity to ozone and the reduction in damage caused by applications of growth regulating and other chemicals. Plants were exposed to ozone concentrations of 15, 30, 45, and 60 pphm in a growth chamber for 1.5, 3, and 6 hr at 25 C, 78-88% relative humidity, and an illumination of 2000 ft-c. Chemicals which retard internode elongation and promoted the dark green color of the foliage reduced visible injury induced by ozone. Two,four-dichlorobenzyltributyl phosphonium chloride (CBBP) and succinic acid 2,2-dimethyl hydrazide (SADH) retarded growth and modified sensitivity of the foliage to ozone. The concentration of SADH needed to reduce injury significantly was at least twice that used to retard stem elongation. Adding L ascorbic acid and a wax coating to the spray solution increased the protection afforded by SADH. Chemicals which did not retard growth of petunia afforded no protection for the ozone-treated plants. The 65 cultivars were placed in six classes based on an average rating of injury after exposures to four doses of ozone. Five cultivars were in a very tolerant class and have the most potential for use in the development of new petunia cultivars resistant to ozone and possibly to other phytotoxicants. (Author abstract modified)

26715 **APTIC NO. 48403**

Comeau, Gilberte and Fabius LeBlanc

EFFECT OF FLUORINE ON FUNARIA HYGROMETRICA AND HYPOGYMNIA PHYSODES. (Influence du fluor sur le Funaria hygrometrica et l Hypogymnia physodes). Can. J. Botany, 50(4):847-856, 1972. 23 refs. Translated from French. 24p., 1972.

Two species of cryptogams were fumigated with hydrofluoric acid to determine their degree of sensitivity to atmospheric fluorine by direct observations of symptoms of chlorosis and necrosis in the leaves; the extent of accumulation of fluorine in the plants and their capacity for recuperation after the fumigation process. The fumigation process consisted of treatment with 13, 65, and 130 ppb HF for 4, 8, and 12 hours and then 13 ppb for 36, 72, and 108 hours. At concentrations of 65 ppb/12 hr, the moss and lichen showed chlorotic spots; some of the chloroplasts started to disintegrate; and plasmolysis occurred. After three weeks of recuperation, the Funaria hygrometrica lost 26-36% and the Hypogymnia physodes lost 36-47% of the fluoride accumulated.

26716 **APTIC NO. 48155**

Dass, H. C. and G. M. Weaver

ENZYMATIC CHANGES IN INTACT LEAVES OF PHASEOLUS VULGARIS FOLLOWING OZONE FUMIGATION. Atmos. Environ., 6(10):759-763, Oct. 1972. 22 refs.

Enzymatic changes in the intact leaves of Phaseolus vulgaris cultivar Seaway 65 (white beans) were studied following ozone fumigation. Peroxidase enzyme increased with the ozone treatment in the first 48 hours. Similarly, cellulase enzyme increased significantly 48 hours following treatment. Lactic dehydrogenase activity was not markedly affected. Disc electrophoretic studies of peroxidase isoenzymes determined that ozone treatment induced a new band of peroxidase. The role of peroxidase, cellulase, and lactic dehydrogenase enzymes in relation to ozone damage and the bronzing disorder in white beans is discussed. (Author abstract modified)

26717 **APTIC NO. 48291**

Haneda, Mikiko and Fumio Tsunoda

INDICATOR PLANT IN FLUORIDE AIR POLLUTION INVESTIGATION. (Fukkabutsu ni yoru taiki osen chosa no tame no shihyo shokubutsu ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(9):449-456, Sept. 1972. 20 refs.

Atmospheric fluoride accumulates in the leaves of some plant species, thus designating them as a fluoride air pollution index. Irises, gladioli, and pines as pollution indicators were tested around an aluminum factory. A very high concentration of fluorine was determined in the upper part of the iris leaf and was in proportion to the actual fluoride air pollution index. A fluorine content of 30-50 ppm (dry weight bases) or 10-20 ppm (wet weight basis) indicated that the air was polluted by fluorides. Similar results were determined for the gladioli and pines.

26718 **APTIC NO. 48208**

Heichel, Gary H. and Lester Hankin

PARTICLES CONTAINING LEAD, CHLORINE, AND BROMINE DETECTED ON TREES WITH AN ELECTRON MICROPROBE. Environ. Sci. Technol., 6(13):1121- 1122, Dec. 1972. 7 refs.

The lead concentration on or in plants near highways suggests that the lead burden of plants is increased principally by deposition onto plant surfaces of lead-bearing residues from vehicle exhausts. Samples of branches of white pine growing by a highway were analyzed by atomic absorption spectrophotometry, and samples of bark from elms on a city street were analyzed with an electron probe microanalyzer. Analysis of the bark of trees revealed that lead, chlorine, and bromine are associated with particles, about 7 micron in diameter on or embedded in the bark. A similarity was noted in size and elemental composition between the lead-bearing particles on trees and some of the compounds emitted in automobile exhaust. The analytical procedure and results are discussed.

26719 **APTIC NO. 48273**

Kamprath, E. J.

POSSIBLE BENEFITS FROM SULFUR IN THE ATMOSPHERE. Combustion, 44(4):16-17, Oct. 1972. 8 refs.

Sulfur is one of the essential elements required for plant growth. The main supply of sulfur in top soils is organic sulfur from the microbial decomposition of the soil organic matter. However, with continued cropping and higher crop yields this supply becomes depleted and is not renewable. Another source of sulfur is the sulfur dioxide present in the atmosphere, most of which results from the burning of sulfur-containing fuels. The SO2 can be utilized by absorption through leaves; cotton plants grown in a greenhouse absorbed 40% of their sulfur from that atmosphere containing 0.01-0.05 ppm SO2. The amounts of sulfur brought down by precipitation and added to the soil vary depending on the industrial activity of the area. In Minnesota, for example, the annual addition of sulfur to the soil ranged from 100 lbs/acre in Minneapolis to 5 lbs/acre in rural areas. In certain areas, this additional sulfur can supply needed sulfur to crops. However, high concentrations of SO2 can damage plants. The implementation of pollution controls to remove sulfur from fuels would reduce the amount of sulfur in the atmosphere and that brought down in rainfall. Where concentrations of SO2 in the atmosphere are not detrimental to humans or vegetation, sulfur-containing fuels can have a beneficial effect on crop production. Where soils are deficient in sulfur, application of 10-25 lbs/acre of sulfur from fertilizer sources is required for optimum crop yields.

26720 **APTIC NO. 48167**

Leibetseder, Josef, Monika Skalicky, Abdul Hakim Said, Alfred Kment, Erich Glawischnig, and Gerd Schlerka

STUDIES OF THE TOXIC EFFECT OF HAY ON CATTLE IN SMOKE-INJURED AREAS. (Untersuchungen ueber toxische Wirkungen von Heu aus Rauchschadengeibieten beim Rind). Text in German. Z. Erzbergbau Metallhuettenwesen, 25(10):498-505, 1972. 21 refs.

In the vicinity of zinc, lead, and sulfuric acid plants in Arnoldstein, Austria, the extent of injuries to the vegetation by the emissions from these plants was determined. The hay from the smoke-injured area was used for feeding experiments with seven test cows for determination of any possible intoxication through the higher lead, zinc, and fluorine intake with the fodder. With the exception of spots on the teeth of about 1/3 of the test cows, no symptoms of intoxication with these elements could be determined. The feeding experiment lasted 6 months. The lead and zinc concentration of the examined hay was above normal, but below the toxic limit. The fluorine concentrations were on the upper limit of the normal values. Clinical examinations including blood tests carried out at 2-week intervals were negative. The lead and zinc concentrations of blood, blood plasma, feces, urine, milk, and hair were below the toxic range. The fluorine concentration in the bones excluded any fluorine intoxication. The milk production of the test animals, however, was significantly lower by 0.64 l/animal/day (average over the total duration of the feeding experiments), compared to the control animals.

26721 **APTIC NO. 48193**

Leibetseder, J., M. Skalicky, A. H. Said, A. Kment, E. Glawischnig, and G. Schlerka

INVESTIGATIONS OF TOXIC EFFECTS ON CATTLE FROM HAY DAMAGED BY INDUSTRIAL SMOKE. (Untersuchungen ueber toxische Wirkungen von Heu aus Rauchschadengebieten beim Rind). Text in German. Erzmetall, 25(10):498-505, Oct. 1972. 21 refs.

Clinical investigations of cattle in a region with industrial smoke and sulfur dioxide hazard, and experimental studies of lactating cows were undertaken. Clinical search and analyses of various enzymes, of the content of the rumen, and of the amount of lead, zinc, and fluorine in feces, urine, milk, and different organs showed no signs of intoxication by the above elements after feeding of damaged hay. However, the milk production was significantly reduced.

26722 **APTIC NO. 48191**

Manning, W. J., W. A. Feder, and I. Perkins

SENSITIVITY OF SPINACH CULTIVARS TO OZONE. Plant Disease Reptr., 56(10):832-833, Oct. 1972. 2 refs.

Six commercially available spinach cultivars were evaluated for sensitivity to ozone at 10, 15, 20, and 25 pphm. Overall injury ratings ranged from no visible injuries to stippling, chlorosis, and necrosis. On the basis of acute ozone injury, the cultivars Bounty and Winter Bloomsdale were less sensitive to ozone at all levels. Both were uninjured at 10 pphm and only slightly injured at 15 pphm. Both of these ozone levels are realistic for Massachusetts during the spring and early summer spinach-growing season. (Author abstract modified)

26723 **APTIC NO. 47997**

Rabinowitz, Michael

PLANT UPTAKE OF SOIL AND ATMOSPHERIC LEAD IN SOUTHERN CALIFORNIA. Chemosphere, 1(4):175-180, July 1972. 8 refs.

A stable isotope technique was employed to distinguish lead coming from soil and air. Oats and lettuce were planted in prepared soil having an unusual isotopic composition. After 2 weeks, half of the plants were moved to a greenhouse in the mountains and the other half were moved 30 m from the San Diego Freeway. The concentration of lead in the diffuse roots of lettuce and oats was about the same as in the soil, while in the leaves, the concentration of lead from the soil was only 0.5-3% as much. Atmospheric lead in the water-washed leaves was 50-20 ppm in the mountains and 50-200 ppm near the freeway. Some of this lead was translocated downward in the plant; 4-10 ppm atmospheric lead was found in the tap roots of lettuce grown near the freeway. In commercial lettuce, more than 90% of the 3-25 ppm lead was from the atmosphere. Wild oats were a useful indicator of atmospheric lead. A survey in Southern California showed that automobile exhaust lead was transported 50-100 km. If lead were removed from gasoline, there would be an immediate decrease of about 80% in the lead content of crops, with a subsequent decrease in human exposure. (Author summary modified)

26724 **APTIC NO. 48374**

Stark, Nellie B. and Patricia F. Harris

STUDIES OF TRACE ELEMENTS IN SOILS AND PLANTS FROM THE FOUR CORNERS AREA OF NEW MEXICO. (FINAL REPORT). Nevada Univ., Reno, Center for Water Resources Research, Environmental Protection Agency Contract 68-02-0269, EPA-R4-72-007, Project Rept. 20, 94p., Sept. 1972. 24 refs.

NTIS: PB 212561

The concentration of eleven trace elements in plants and soil in the Four Corners area of New Mexico was measured to develop background and preliminary data on the environmental effects of coal-fired power plants in the area and data on the potential buildup of each trace element. The elements included arsenic, beryllium, cadmium, chromium, fluoride, lead, manganese, mercury, molybdenum, nickel, and selenium and were chosen on the basis of the chemical makeup of the fly ash emitted by the power plants. Instrumentation, sample collection and preparation, testing procedures, and results are reviewed. Complete analytical data are presented. (Author introduction modified)

26725 **APTIC NO. 48300**

Vogl M., O. Tschacksch, H. Enderlein, S. Boertitz, and E. Haedicke

INVESTIGATIONS FOR DEVELOPING A RAPID TEST METHOD FOR SO2- RESISTANCE OF SPRUCE (PICEA ABIES(L.)KARST.). (Untersuchungen zur Entwicklung eines Schnelltestes zur Bestimmung der SO2 Resistenz bei Fichte (Picea abies(L.)Karst.)). Text in German. Biol. Zentralbl., 91(5):601-612, 1972. 34 refs.

Various smoke resistance testing methods were compared and evaluated for their suitability for a rapid determination of the sulfur dioxide resistance of spruces. Of the indirect methods the carbon hydrate needle analysis was performed on ten potted species of picea omorika and on pinus silvestris needles. The glukose, saccharose, and total sugar concentration of the juices pressed from the needles was analyzed. In a second indirect testing method, cut shoots of young spruces were placed into 0.5% neutral solution of sodium bisulfite at 20 C and 70% relative humidity. Parallel to the indirect methods rooted, young spruces or cuttings of spruces placed into water were exposed to high SO2 concentrations for short periods of time. Gas exchange of cut, in water exposed twigs of young spruces was comparable to that of rooted plants under certain conditions. For a rapid smoke resistance determination, vital potted young spruces with uniform light exposure or cut spruce branches, which are cut for a second time under water, can be exposed to SO2. The high-concentration-short-period fumigation should take place at 2000 lux and under diffuse light, with a temperature of 10 C to maximum of 25 C and a relative humidty of not less than 40%.

1971

26726 **APTIC NO. 48413**

Bossavy, J.

AIR POLLUTANTS AND THEIR EFFECTS ON PLANTS. (Les polluants atmospheriques, leurs effets sur la vegetation). Ann. Gembloux, no. 77:163-173, 1971. Translated from French. 14p.

The effects of air pollutants on plants are reviewed with respect to types of air pollutants, symptoms of damage, and species affected. Plant damage was surveyed in France, East and West Germany, Austria, Greece, the Netherlands, Norway, Poland, Rumania, Sweden, Switzerland, Turkey, and Czechoslovakia. The pollutants of greatest concern with respect to plant damage included fluorine compounds, sulfur compounds, especially sulfur dioxide, smoke, ethylene, and metal compounds. Some emission sources are also discussed.

26727 **APTIC NO. 48414**

Brinckmann, Enno, Ulrich Luettge, and Karl Fischer

THE EFFECT OF SO2 ON BISULFITE COMPOUNDS ON PHOTOSYNTHESIS, ION TRANSPORT, AND REGULATION OF STOMATA IN LEAVES OF HIGHER PLANTS. (Die Wirkung von SO2 und Bisulfitverbingungen auf Photosynthese, Ionentransport und Spaltoeffnungs-regulation bei Blaettern von hoeheren Pflanzen). Ber. Deut. Botan. Ges., 84(9):523-524, 1971. 5 refs. Translated from German. 2p., 1972 (?).

The effects of sulfur dioxide and bisulfite compounds on the leaves of higher plants were examined and are summarized. The attack of SO2 gas leads to acute and chronic (chlorophyll decomposition and necrosis) damage. The SO2 inhibits photosynthesis and interferes with the mechanism of stoma regulation: with SO2 admixture to the atmosphere, the rates of water vapor output, carbon dioxide intake, and SO2 intake behave as a damped oscillation. Bisulfite compounds act in very small concentration to produce outwardly visible damage.

26728 **APTIC NO. 48415**

Impens, R.

CONTAMINATION OF VEGETATION BY TETRAETHYL LEAD. (Contamination de la vegetation par le plomb tetra-ethyle). Ann. Gembloux, vol. 77:225-234, 1971. 14 refs. Translated from French. 12p.

Contamination of the soil and vegetation by tetraethyl lead is reviewed. Exhaust gases are presently the principle source of tetraethyl lead emissions near highways, with concentration and distribution depending on traffic intensity, urban concentration and distribution depending on traffic intensity, urban concentration, and climate, other definitive parameters with respect to king and amount of contamination include the distance of the vegetation from the roadway, time of exposure, and anatomical and morphological characteristics of the plant. The absorption of lead by plants and the nutritional and bromatological repercussions of lead contamination of plants are examined.

EFFECTS-MATERIALS

1972

26729 **APTIC NO. 47893**

Hanada, Kango, Toshio Kimoto, and Rumi Hasegawa

THE RUBBER METHOD FOR DETERMINING OZONE LEVELS. (Gomu ni yoru okishidanto monita ho). Text in Japanese. Japan Society of Air Pollutuion, Proc. Symp.

Japan Soc. Air Pollut., 13th, 1972, p. 70. (Nov. 7-9, Paper 18.)

A new and simple method of measuring the effect of ozone on rubber is reported. A piece of new rubber was accurately measured to the 1/10 mm order, and a 360 g tension was given. The elongation was measured and a number of pieces with the same tensility were prepared to get the symmetry. The rubber pieces were exposed to a simple apparatus producing 0.1 ppm ozone. After a 7 day exposure, the lengths of four pieces of rubber were compared. The pieces that were originally 5.15 cm (with all 5.45 cm tensility) had deteriorated to 5.75, 5.75, 5.77, and 5.75 respectively. Both lab and field tests ascertained the accuracy and dependability of this method.

26730 **APTIC NO. 48151**

Salvin, Victor S.

THE EFFECTS OF AIR POLLUTANTS ON TEXTILES: WHOSE PROBLEM? J. Amer. Assoc. Text. Chem. Color., 4(10):225-228, Oct. 1972. 8 refs.

The effects of air pollutants on textiles are discussed. The leading air pollutants (sulfur oxides, oxides of nitrogen, ozone and particulates) and their sources are identified. Gas fading on cellulose acetate, ozone fading of permanent press, and the effects on white permanent press, nylon, and cotton fabrics are described. Research leading to the development of intermediaries to reduce gas fading, to new dye structures and processes, and to the use of fiber variants is reviewed.

26731 **APTIC NO. 47925**

Schummer, Arthur

COMMENT ON THE CORROSIVE PROPERTIES OF THE AIR OF A MINING AREA. (Note sur la corrosivite de l atmosphere du bassin minier). Text in French. Rev. Tech. Luxembourg., no. 3:147-149, July-Sept. 1972. 4 refs.

One-year corrosion tests of unalloyed steel, performed in a mining area in Differdange, are described. The loss of weight was determined to be 2.7 g/sq dm, a value characteristic of rural atmosphere. The low rate of corrosion is due to the atmospheric sulfur dioxide concentrations being relatively low (diurnal average of 120 micrograms/cu m during the Feb. 21 through March 31, 1972 period), and to the density of domestic heatings being lower than in urban areas.

EFFECTS-ECONOMIC

1972

26732 **APTIC NO. 48386**

Ad Hoc Committee on the Cumulative Regulatory Effects on the Cost of Automotive Transportation

CUMULATIVE REGULATORY EFFECTS ON THE COST OF AUTOMOTIVE TRANSPORTATION (RECAT). (FINAL REPORT). 353p., Feb. 28, 1972. 147 refs.

The cumulative effects on the cost of automotive transportation of a wide variety of regulatory and legislative actions that are designed to reduce atmospheric pollution and to mitigate the number of deaths and the severity of injuries caused by automotive accidents were studied. The issues and costs related to the control of automotive emissions are examined, including air quality estimates, federal standards, control technology, cost/benefit relationships for emission controls, testing and inspection of vehicles, effects on the petroleum refining industry, costs of motor vehicle accidents, safety features and regulations, transportation systems, and noise abatement. The average increase in the retail price of an automobile by 1976 resulting from compliance with presently planned regulations related to safety, damage limiting design, and emission control was estimated at $873.

26733 **APTIC NO. 48171**

Fredriksen, Heige

POLLUTION PROBLEMS IN THE NORWEGIAN INDUSTRY. (Forurensningsproblemer in norsk industri) Text in Norwegian. Tidsskr. Kjemi, Bergvesen, Met., 32(2):9-14, Feb. 1972.

The state of pollution control and planned investments in various branches of industry in Norway are reviewed. In addition to $70,000,000 already invested in industrial emission control, about $14,000,000 more will be necessary over the next few years. The aluminum industry, with a yearly output of 500,000 tons, has completed a comprehensive emission control program. Some 8000 tons of fluorides, out of a total of 10,000 tons, are collected. The operating cost of cleaning equipment adds $5.60 to the cost of 1 ton of aluminum. Red smoke emissions from iron and steel plants have been considerably abated, from 1000 to 20 kg/hr in one case. The additional costs are 70-118 cents. The chemical industry has invested $9.52 million for emission control equipment, whose operating costs are $9.3 million/yr. Oil refineries, emitting considerable amounts of sulfur dioxide, soot, and hydrocarbons, will invest $1.4 million over the next 2 years in addition to a $2.1 million investment already realized. One refinery recovers 6000 tons of sulfur from high-sulfur raw products yearly. Cement works have invested $5.60 million for electrostatic dust precipitators. Some 70-90% of the total SO2 emission is bound to the clinker. The fish processing industry has invested $.84 million for odor control; while combined scrubbing and incineration would require another $11.9 million. The melting industry has invested $7.28 million for the control of dust emissions. The investments by the wood processing and pulp and paper industries run to $14 million.

26734 **APTIC NO. 48290**

Goldmuntz, Lawrence A.

THE REGULATED AUTOMOBILE. Automotive Eng., 80(12):42-49, Dec. 1972.

The effects of automotive safety and emissions regulations are discussed, and a study to determine the cost-benefit relationshi of various Federal regulations is reviewed. Major regulatory agencies and standard-setting bodies are listed. The costs to the consumer of the various safety and emission control standards scheduled to go into effect by 1976 as estimated by the automotive companies, the regulatory agencies, and the Office of Science and Technology study committee are presented. Estimated automotive emission control costs and benefits are compared. The impact of the nitrogen oxides automotive emission standard is also reviewed.

26735 **APTIC NO. 48220**

Schneider, Hans K.

PROTECTION OF THE ENVIRONMENT VIEWED AS AN ECONOMY PROBLEM. (Umweltschutz als oekonomisches Problem). Text in German. O.Z.E. (Oester. Z. Elektr.), 25(9):335-341, Sept. 1972. (Presented at the Verband der Elektrizitaltswerke Oesterreichs Meeting, Salzburg, Austria, June 13-16, 1972.)

Economic problems of environmental protection are reviewed. Environmental protection should orient on technically possible and economically expedient measures to achieve optimal solutions to environmental problems, rather than on exaggerated, irrealistic standards. Though it would be possible even in the free enterprise system to promote environmental protection interests through the application of price corrections, levies to be imposed or raw materials, and recycling subsidies, differences in environmental needs and requirements, and consequently in environmental protection-related spending in different countries are likely to create shifts in the economy and on international markets.

26736 **APTIC NO. 47919**

Weidensaul, T. C. and N. L. Lacasse

RESULTS OF THE 1969 STATEWIDE SURVEY OF AIR POLLUTION DAMAGE TO VEGETATION IN PENNSYLVANIA. Plant Disease Reptr., 56(8):701-704, Aug. 1972. 4 refs.

Air pollution damage to vegetation in Pennsylvania was surveyed in the summer of 1969 to determine economic losses incurred on food, fiber, and ornamental crops. Most incidents occurred in areas of greatest agricultural activity. Greatest economic losses were on vegetable, fruit, and agronomic crops, followed by lawns, ornamentals, greenhouse flowers, and forest trees. The suspected major pollutants in decreasing order of importance were oxidants, sulfur oxides, lead, hydrogen chloride, particulates, herbicides, and ethylene. The total amount of direct economic loss was estimated at over $3.5 million; indirect economic losses, including losses due to crop substitution, grower relocation costs, and profit losses, accounted for an additional $8 million. Unassessed indirect losses included changes in vegetation type, decrease in water retention capacity of watersheds, erosion and stream silting, losses to related industries, and agricultural land forced out of production. (Author abstract modified)

1971

26737 **APTIC NO. 47969**

Ackermann, Klaus, Horst Geschka, and Detlev Karsten

EVALUATION OF THE TOTAL LOAD OF THE NATIONAL ECONOMY AS AFFECTED BY THE FEDERAL GOVERNMENT ENVIRONMENTAL PROGRAM. (Gutachten zur Gesamtbelastung der Volkswirtschaft durch das Umweltprogramm der Bundesregierung). Text in German. In: Materialien zum Umweltprogramm der Bundesregierung 1971. Umweltplanung. Lower House of Parliament, 6th Session, Document 6/2710, p. 593-633, Oct. 1971.

Costs of the German Federal Government Environmental Program during the 1971-1975 period are estimated. The total amount of environmental protection-related investments by mining, power engineering, stone, ceramics, glass, chemical and building industries, agriculture, forestry, transportation, households, administrations, waste management and military during the 1971-1975 period is estimated 7 billion, with operating costs accounting for another $2 billion. The expenditures for air pollution control by power engineering, mineral processing, chemical and transportation industries will be 7, 25, 200, 240 million dollars respectively.

STANDARDS AND CRITERIA

1972

26738 **APTIC NO. 48298**

Alberte, Tony

ENGINE HORIZONS. THE NEW FEDERAL EMISSIONS REGULATIONS. Diesel Gas Turbine Progr., 38(1):9, Nov. 1972. 1 ref.

The 1973/1974 California and 1974 Federal limits on gaseous emissions from diesel and gasoline engines in heavy duty trucking service are compared, the new Federal diesel smoke limits are shown. California has no smoke regulations. Differences between the California and Federal test procedures are also indicated. The possibility that 1976 Federal limits on heavy duty vehicles will be more stringent than 1975 California limits is noted.

26739 **APTIC NO. 48164**

Hauser, Thomas R. and Carl M. Shy

POSITION PAPER: NOX MEASUREMENT. Environ. Sci. Technol., 6(10):890-894, Oct. 1972.

The current status of nitrogen oxides control regulations, analytical techniques, and measurement methods are discussed. Recent Environmental Protection Agency studies indicated that the referency method for measuring nitrogen dioxide in ambient air seemed to posses inherent deficiencies which may have caused an overestimation of the extent of the NO2 problem, and that a reassessment of regulations and classifications was necessary. The present reference method for the analysis of NO2 in ambient air and the validity of past data were reviewed. Effects on stationary source decisions, on mobile sources of NO2, and on the national primary NO2 standard are discussed.

26740 **APTIC NO. 48204**

Jenkins, Richard E. and Gary D. McCutchen

NEW SOURCE PERFORMANCE STANDARDS. Environ. Sci. Technol., 6(10):884-888, Oct. 1972.

The concept and procedure followed in establishing Federal performance standards for new sources and the standards that have been established to date are summarized. Air emission limitations were considered for nine source categories: primary nonferrous smelters, aluminum reduction plants, kraft paper mills, gas turbines, coal cleaning plants, phosphate fertilizer plants, ferroalloy plants, secondary aluminum smelters, and electric arc steel furnaces. Emission tests were conducted and standards were set for sulfur dioxide, nitrogen oxides, particulates, visible emissions, and acid mists from fossil fuel-fired steam generators, municipal incinerators, Portland cement plants, nitric acid plants, and sulfuric acid plants. Testing procedure and data acquisition are described and the emission test results are listed. Emission improvement required and costs resulting from the performance standards are presented. Control equipment is also mentioned.

26741 **APTIC NO. 48251**

Watanabe, Hiroshi

ENVIRONMENTAL STANDARD FOR EXHAUST GAS, AND ITS INTERPRETATION. (Haigasu no kankyokijun to sono kangaekata). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Kansai Branch, p. 1-8, 1972. (Presented at the Japan Society of Mechanical Engineers, Kansai Branch, Lecture Meeting, 17th, Osaka, Japan, Dec. 5-6, 1972.)

The traditional view of the Japanese toward the environment has been a passive nature in that the environment is considered something that always gives benefits to man and that should not be controlled by man. Westerners take a positive attitude toward it that their living can not be maintained unless it is brought under control. This lack of a positive attitude toward the environment among Japanese is one of the main reasons for the deterioration of the environment in Japan. To solve problems of environmental pollution, the Japanese should change their traditional view and take a more positive and scientific approach. Environmental control standards comprise standards for administrative control, criteria for determination of pollution, and guides for pollution control. Article Nine of the Basic Law for Environmental Pollution Control defines the environmental standards for pollution of air, water, and soil, and noise. Based on the conditions that pollution should not worsen the condition of the sick, should not increase the death rate, should not increase respiratory diseases, and should not result in symptoms undesirable to the respiratory function of children, the environmental standards for sulfur oxides have been set up. They are 0.05 ppm for the 24-hour average of 1-hour values and 0.1 ppm for 1-hour values. The new environmental criteria for suspended dust are 0.1 mg/cu m for the 24-hour average and 0.20 mg/cu m for any 1-

hour value. Environmental standards for carbon monoxide and nitrogen oxides are also briefly discussed.

LEGAL AND ADMINISTRATIVE

1972

26742 **APTIC NO. 47978**

Ministry of International Trade and Industry (Japan)

A REPORT ON THE SURVEY OF THE ENVIRONMENTAL CONDITIONS OF THE KAWASAKI-YOKOHAMA INDUSTRIAL AREA. (Kawasaki-Yokohama chiku konbinato kanyo hozen chosa hokokusho). Text in Japanese. 62p., Dec. 1972.

According to the records of sulfur oxides measured between 1967 and 1971 in this area, the environmental conditions are improving every year; but excepting one measuring location, no measurements have reached the standard. Settling particles have decreased in general; the 1971 measurements at five locations ranged from 5.70 t/sq km/mo to 15.62 t/sq km/mo. The daily 24-hour averages of suspended particulates measured at five locations on March 31 ranged from 71 micrograms to 144 micrograms/cu m. The total stack gas emission in 1970 was 16,319,000 N cu m/hr, and is expected to be 16,134 N cu m/hr. However, the amount of sulfur oxide emission is expected to reduce by 68% from 6448 N cu m/hr of 1970 to 2052 N cu m/hr in 1975. Dust emissions are expected to reduce by 40% for the same period, from 1305 kg/hr to 779 kg/hr. High stacks are gradually increasing; however, as of 1975, 92% of all stacks will be still less than 70 m, due to the adjacent airport and the civil aeronautic rulings on high level emissions. Plans for the installation of electrostatic precipitators for 1975 include 22 systems. The total number of the desulfurization systems for stack gases will be 18 by 1978, for all industries combined.

26743 **APTIC NO. 48435**

THE INDUSTRIES OF THE ENVIRONMENT. (Les industries de l environnement). Text in French. Ann. Mines (Paris), 1972:9-22, Nov. 1972.

Findings of a survey of French industries engaged in the manufacturing of environmental pollution control equipment (air and water pollution, noise, waste management, and control and measuring instrumentation) are presented. The highly competitive branch of air pollution control equipment manufacturing experienced a normal growth of 10-15% in 1970-1971. The 1971 earnings reached some $60,000,000, 15-20% of which was realized from exports. Research outlays accounted for 2-3%. The use of foreign patents was remarkable. Contacts between individual manufacturers are intensifying. Most of the few giant manufacturers are affiliated or have close ties with foreign companies. The environmental instrumentation industry, with a combined earning estimated of $40,000,000 is credited with further dynamic expansion. With the national market being rather limited, exports are fairly modest presently.

26744 **APTIC NO. 48451**

Federal Aviation Administration, Washington, D. C.

FINAL ENVIRONMENTAL IMPACT STATEMENT. ROCKINGHAM COUNTY AIRPORT, REIDSVILLE, NORTH CAROLINA. 47p., March 28, 1972.

NTIS: PB 204259

The Rockinghan County Airport Authority requested Federal funds for construction of a general utility airport to accommodate all propeller aircraft of less than 12,500 pounds. As a result, an environmental impact statement was filed which showed there will be about 80 acres of tree clearing; slightly increased intermittent noise levels are expected; and slightly increased air pollution will occur due to operations of these aircraft and short-term adverse effects associated with normal construction techniques. The alternatives to the proposed project which were considered were construction of the airport at a different site and no construction of an airport at all. The proposed airport was discussed at a public hearing and several objections were brought up. Comments from Federal, State, and local governmental agencies are included.

26745 **APTIC NO. 48100**

Copeland, Otis L. and Paul E. Packer

LAND USE ASPECTS OF THE ENERGY CRISIS AND WESTERN MINING. J. Forestry, 70(11):671-675, Nov. 1972.

Coal deposits in western states are increasingly being surface-mined in large quantities, partially to offset the present energy crisis, and also because the sulfur content of the coal is generally less than 1%. Deposits of oil shale, phosphate, uranium, and 88 other minerals are also candidates for surface mining, which disfigures landscapes, obliterates vegetation, and often destroys wildlike habitat. In the future, mining developments must be directed toward preserving or restoring acceptable surface environment. This can be accomplished only if Federal agencies, the affected states, and the mining industry participate in a program to develop uniform criteria for administering mineralized lands; plan alternative operating systems to reduce environmental degradation; develop and evaluate alternative land rehabiliation treatments; and provide tools with which findings can be applied to future developments.

26746 **APTIC NO. 48194**

Fri, Robert W.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. Federal Register, 37(187):20117-20118, Sept. 26, 1972.

A change was made in Section 52.1125 of Chapter I, Title 40 of the Code of Federal Regulations. The revision modifies the compliance schedules as they relate to identified sources, and is consistent with the requirements of the Clean Air Act. A copy of the implementation plan is available for public inspection.

26747 **APTIC NO. 48402**

Gildenskiold, R. S.

HYGIENE DOCUMENTATION OF THE AIR IN EARLY STAGES OF PLANNING INDUSTRIAL CENTERS. (K razrobotke dokumentatsii po gigiene atmosfernovo vozdukha na rannikh etapakh proektorovaniya promyshlennikh uzlov). Gigiena i Sanit., 37(1):54-57, Jan. 1972. 2 refs. Translated from Russian. 6p., 1972.

The sanitation-hygiene problems which become evident during preventive sanitation inspection can be most effectively solved by thorough analysis, at the earliest state, of predesign data for selecting projected construction sites. The common and basic question at the first design stage is determining the necessary sanitation-protective zone between the projected industrial center and the residential area. The second most important is the correct evaluation of localized and overall meteorological conditions, particularly wind speed and direction, air temperature, and precipitation amount. Information on the technical characteristics of the projected industrial complexes is also required.

26748 **APTIC NO. 47858**

Huston, J. Spenser and Susan J. Fansmith

CONTROLLING THE URBAN TRAFFIC ENVIRONMENT. Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 229-234, 1972. 4 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)

Traffic control in Philadelphia was investigated to formulate alternative control actions, to evaluate their impact on automobile emissions, and to group these alternatives into strategies which would substantially reduce vehicle emissions in core areas. The formulation and evaluation of alternatives; traffic study results with respect to total emissions of carbon monoxide, hydrocarbons, and nitrogen oxides, flow maps, and traffic speeds; and strategy development and implementation are reviewed.

26749 **APTIC NO. 48199**

Inoue, I.

DEVELOPMENT OF AND COUNTERMEASURES FOR AIR POLLUTION IN JAPAN. (Wagakuni no taiki osen no suii to sono taisaku). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(5):2-11, Oct. 1972.

In Oct. 1970, the Anti-pollution Corporation was established in order to construct joint anti-pollution facilities (processing plants and apartment houses), to prepare alternate plant sites, joint welfare facilities (green belts), and to finance anti pollution facilities of individual operators. Its operation fund in 1971 was $144 million and capital increased to $100 million. The law determines the range of pollutions to combat, responsibilities of those concerned with prevention of pollution, basic policy on anti-pollution, and anit-pollution administration. Environmental standards were established, and a white paper on pollution is to be published. The Japan Environmental Agency made its start on July 1, 1971 to make overall adjustment on the administration for protection of the environment. In the new economic and social development plan, established in May 1970, anti-pollution measures are incorporated, stressing the need for strengthening of control, improved structure, more research, technical development, regional policy on combating pollution, and systemizing these policies. As of Jan. 1972, there were about 500 monitoring stations monitoring air pollution and about 100 stations monitoring exhaust. Governors are authorized to issue orders to sources of pollutants to decrease their emissions. What is necessary is to alter the people s frame of mind which gives too much stress on rapid economic growth and devise Net National Welfare, instead of Gross National Product, thus giving a new importance to the problem of pollutions with a new social index.

26750 **APTIC NO. 47981**

Kiyoshige, Hayashi

APPROACH TO CLOSED-SYSTEM FOR AIR POLLUTION. (Taiki osen ni okeru kurozudosistemu eno apurochi). Text in Japanese. Kagaku Kojo (Chem. Factory), 16(11):35-38, Nov. 1972.

Three principles (total, control, and energy) for the prevention of air pollution are discussed. A total closed-system has desulfurization completed at the crude oil stage. Gasification is much more economical than exhaust gas desulfurization. The idea of a Kombinat which has been considered as a combination of petroleum products and their decomposed products should be changed and new type of Kombinat should be developed which has a drainage and air escape system and apparatus for industrial scrapped material. The principle of control including measurement, recording and alarms should be studied and developed for the management control system. Pollution has occurred as a result of mass production and mass consumption, therefore, the principle of economy says a scheme for reutilization of everything should be developed. For example, by making use of adsorption and desorption of active carbon which can be produced from industrial scrapped materials, active carbon which can be used not only in drainage management but also in air pollution management.

26751 **APTIC NO. 48218**

Luers, Hartwig

HERE THERE IS A PROBLEM OF CONTROL. (Hueben wie drueben ein Problem der Kontrolle). Text in German. Umwelt (Duesseldorf), 2(6):48-52, 1972.

The German Democratic Republic recognized much earlier than the Federal Republic of Germany that administrative means do not suffice for improving protective measures of the environment. The GDR has recently turned to exerting economic pressure by imposing waste water and emission fees which have to be paid by the emitter. In the FRG doubts are voiced concerning the positive effect of laws; in the GDR the attitude is a positive one. It is generally believed that environmental pollution can be controlled by efficient legislation. The overall pollution of water bodies and the atmosphere is higher in the GDR. The annual emission of fly ash is reported to reach 10 to 15 million tons. The sulfur dioxide emission in this country amounts to 2.5 million tons which is more than half the amount reported for the FRG, although the GDR is not quite half the size of the FRG. The automobile emissions are less in the GDR.

26752 **APTIC NO. 48260**

Paffrath, Dieter

CONTRIBUTIONS BY DFVLR TO ENVIRONMENTAL RESEARCH AND ENVIRONMENTAL PROTECTION. PART I: CLEAN AIR MAINTENANCE. (Beitraege der DFVLR zur Umweltforschung und zum Umweltschutz. Teil I: Reinhaltung der Luft). Text in German. Deut. Forschungs Versuchsanst. Luft Raumfahrt, DFVLR-Nachr., 2(7):283-286, Aug. 1972.

The activity of the German Association of Space and Aviation Research in environmental research is reviewed. General atmospheric physics, turbulence and exchange processes, and flow dynamics with regard to aircraft noise abatement are studied, while other activities focus on the development and the use of airborne monitoring devices for studies of atmospheric and terrestrial phenomena and for the location of emission sources. Measurements of the vertical aerosol distribution by means of the lidar system revealed a nearly steady aerosol layer at about 18 km. Other research projects are concerned with chemical, physical, and thermodynamic processes occuring in aircraft engines, and their effects on pollutant emissions. The effects of different modes of fuel admission (aerosol injection, gasification, and membrane layer evaporation) on the combustion process are being studied.

26753 **APTIC NO. 48434**

Pleinevaux, C.

A COMMUNITY PROGRAM RELATED TO THE ENVIRONMENT. (Un programme communautaire en matiere d environnement). Text in French. Tribune CEBEDEAU (Centre Belge Etude Doc. Eaux), 25(348):476-480, Nov. 1972.

Basic features of the environmental policy of the European Economic Community are outlined. Pollution control, preservation of natural resources, space management, and satisfaction of human needs in terms of quality and quantity are the major goals of the environmental policy. Integrated air pollution research, introduction of uniform pollution control measures and hygienic standards, and uniform criteria for the assessment of health and environmental hazards of environmental pollution are envisaged. All these, along with uniform legislative principles and sanctions concerning pollution, especially the polluter-must-pay principle, will help toward minimization of obstacles and distortions in free trade among the members of the Common Market.

26754 **APTIC NO. 48196**

Schmitz, Paul

REPORT ON THE EUROPEAN GUIDELINES CONCERNING THE LIMITATION OF EMISSIONS BY DIESEL AUTOMOBILES. (Mitteilungen ueber Europaeische Richtlinien ueber die Begrenzung von Emissionen aus Dieselfahrzeugen). Text in German. Staub, Reinhaltung Luft, 32(11):458-459, 1972.

The Council of the European Communities has issued a guideline for the purpose of adapting uniform legal regulations in all member nations concerning measures against the emissions by diesel engine automobiles. The guideline is based on the technical specifications which have been approved by the United Nations Economic Commission for Europe. According to the recommendations of the guideline the results of exhaust gas extinction measurements shall be entered into a form. In 10 published supplements, the test conditions, test methods, criteria for the application of the measuring units, and the limits for various exhaust gas throughputs are described. The absorption cocoefficient k is used as a measure for the quantity of emitted solid particles. The coefficient is determined by extinction measurements of the exhausts according to the law phi equals phi (o) e (-kL), where phi is the light beam after passage of the sample, phi o the entering light beam and L the real length of the light absorption path. A different set of limit values is given for the test at various constant rpms and for the test at free acceleration. The chemical and physical data of the fuel used for this test must correspond to a reference fuel.

26755 **APTIC NO. 48362**

Stein, Arnold

GUIDE TO ENGINEERING PERMIT PROCESSING. Pacific Environmental Services, Inc., Santa Monica, Calif., Office of Air Programs Contract CPA 70-122, Rept. APTD-1164, 380p., July 1972. 97 refs.

NTIS: PB 211916

The design and administration of permit systems, engineering evaulation of pollutant sources and equipment inspection procedures, and methods for acquiring and processing technical and legal information on the sources of air pollution are discussed. Permit fees, application forms, inspections, hearings, court decisions, data and information systems, permit processing information systems, computer processing, data entry systems, microfilm, and cost-effectiveness are outlined. Sources, emission limits, emission standards, equipment standards, process standards, and zoning are mentioned. The procedure for an engineering evaluation of the application for a permit to construct is outlined. Examples of permit reviews are given for a sulfuric acid plant, a coal-fired boiler with an electrostatic precipitator, lithograph oven with an afterburner, incinerator with a precipitator, a baghouse for a cement kiln, asphalt concrete batching with a multiple-cyclone and baghouse, brass reverberatory furnace and baghouse, grey iron cupola and baghouse, gasoline storage and transfer system, rendering cookers with a condenser and vapor incinerator, triple superphosphate plant, ammonium nitrate plant, and a sewage sludge incinerator. Job and task analysis of the New York City Department of Air Resources and excerpts of rules and regulations applicable to the permit system are discussed in appendices.

26756 **APTIC NO. 48352**

Wohlers, H. C.

THE AIR POLLUTION LABYRINTH. Int. J. Environ. Studies, vol. 3:29- 33, 1972. 2 refs.

The single major cause of air pollution throughout the world is combustion effluents. Presently the world per capita average consumption of energy is 1.5 kilowatts thermal; for the United States, the average is 10.05 kwt. For the future, the combustion problem will become more acute as developing countries become more industrialized. To control combustion products from fossil or atomic fuels for a rising world population and affluence, a more regimented society is visualized. In the future society, scientists must play a leading role in evaluating the total effects of all new technological developments--including as yet unforeseen sources of energy. The scientist must join forces with men from other disciplines for a global systems analysis to attack and solve urban environmental problems. (Author abstract modified)

26757 **APTIC NO. 47887**

Yamaki, Naoomi

AUTOMOBILE EMISSION GASES AND PHOTOCHEMICAL SMOG. (Jidosha haishutsu gas to ko-kagaku smogu). Text in Japanese. Nenryo Kyokaishi (J. Fuel Soc. Japan, Tokyo), 51(546):993-999, Oct. 1972. 15 refs.

The first Japanese automotive emission control law referred only to carbon. A special committee set up a long-term policy for automotive emissions which urged emission standards for carbon, hydrocarbons, and nitrogen oxides for 1975 and 1976. The strict standards were set according to the Muskie method. Lead in gasoline has been restricted to 1.1 ml/gal since July 1, 1970; no lead will be allowed after April 1974. Automobile and oil industries, cooperating with the government, have been conducting various research projects. In July 1970 photochemical smog was realized to be important. Standards for nitrogen oxides and oxidants are being set up. Photochemical pollution has affected the Tokyo metropolitan area, the Osaka-Kobe area, and Aichi, Okayama, and Ehime Prefectures. Oxidants are now measured at eight sites by the National Atmospheric Measurement Bureau, at 122 sites by the Local Daily Atmospheric Measurement Bureau, and at 35 sites by the Local Automobile Emission Measurement Bureau.

26758 **APTIC NO. 48245**

Yuge, Seiichiro

POLLUTION CONTROL CENTER OF SAITAMA PREFECTURE. (Saitama-ken kogai senta shokai). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 8(10):731-736, Oct. 1972.

The Pollution Control Center of Saitama Prefecture was completed in May 1972. The construction of the building was started in June 1971, with a total cost of approximately $2,339,390. The total staff consists of 31 members. Its centralized air pollution monitoring network system has a telemeter system, nine stationary measuring stations, and a number of mobile monitoring vehicles. The system communicates with the air pollution control centers of Tokyo Metropolitan government and Kanagawa and Chiba Prefectural governments. The monitoring network conducts continuous measurements of sulfur oxides, suspended particulates, carbon monoxide, nitrogen dioxide, nitric oxide, oxidant, hydrocarbons, wind direction, wind velocity, temperature, humidity, and the sunlight quantity. The center also has a warning network connected with the prefectural health centers, cities, townships, and cooperating factories where warning receivers are installed. The systems s flowcharts are presented.

1971

26759 **APTIC NO. 47958**

Bundesministerium des Inneren, Bonn (West Germany)

ENVIRONMENTAL PROTECTION PROGRAM OF THE FEDERAL GOVERNMENT. (Umweltprogramm der Bundesregierung). Text in German. In: Materialien zum Umweltprogramm der Bundesregierung 1971. Umweltplanung. Lower House of Parliament, 6th Session, Document 6/2710, p. 1-50, Oct. 1971.

General principles of the Environmental Protection Program of the German Federal Government are presented. Securing a decent, healthy environment, and preventing or eliminating anthropogenic damages to the environment are the main objectives of the environmental program. The quality of the environment will be largely determined by the control program, with technical advancement and economic growth in harmony with environmental needs. The polluter-must-pay principle, supported by adequate financing and tax policies, will be applied. Environmental protection measures concerning air pollution control will encompass the determination of maximum allowable pollutant concentrations to be observed in industrial planning, and the setup of a smog warning network.

26760 **APTIC NO. 47967**

Bundesministerium des Inneren, Bonn (West Germany), Arbeitsgruppe Raumordnung und Staedtebau

CONTRIBUTION OF THE SPACE PLANNING AND CITY DESIGN WORKING GROUP. (Beitrag der Arbeitsgruppe Raumordnung und Staedtebau). Text in German. In: Materialien zum Umweltprogramm der Bundesregierung 1971. Umweltplanung. Lower House of Parliament, 6th Session, Document 6/2710, p. 549-563, Oct. 1971.

Environmental aspects and space and city planning in West Germany are outlined. Intensified urbanization processes increases in residential and forest areas, and regressions of the agriculturally used areas during the period ending 1980 are expected. Agglomeration of residential, business, and educational areas; separation of such areas from industrial agglomerations with intense emissions; the creation of recreational areas near cities; and pollution and noise abatement in urban areas by special city planning and architectural measures are among the chief objectives in space management. The use of long-distance heating will acquire increased importance.

26761 **APTIC NO. 47968**

Bundesministerium des Inneren, Bonn (West Germany)

EVALUATION OF THE APPROPRIATE ORGANIZATION OF ENVIRONMENTAL COUNSELING FOR THE FEDERAL GOVERNMENT AND OF THE APPROPRIATE FORM OF COUNSELING FOR ACTIVITIES TO BE ACHIEVED AT NON-MINISTERIAL LEVEL. (Gutachten zur geeigneten Organisationsform der wissenschaftlichen Beratung der Byndesregierung in Umweltfragen und zur geeigneten Form der Beratung bei der Durchfuehrung von nichtministerieller Taetigkeit). Text in German. In: Materialien zum Umweltprogramm der Bundesregierung 1971. Umweltplanung. Lower House of Parliament, 6th Session, Document 6/2710, p. 565-591, Oct. 1971.

Appropriate organization and forms of the counseling activity necessary for decisions-making at both cabinet and non-ministerial levels in matters of environmental protection are discussed, and corresponding organizational suggestions are made. Short-term decisions will be prepared by an environmental board of about 20 experts, five of whom will form a standing committee of the environmental board, possibly in cooperation with special task groups and ad hoc commissions. Long-term decisions-making of principal nature will be prepared by an independent Working Group for the Realistic Complex Analysis of the Environmental Protection Problem. The activity of existing research and development institutions, including federal ones, should be integrated and coordinated. The organization of and the cooperation between most of these institutions is not optimal at the present time.

26762 **APTIC NO. 47970**

Bundesministerium des Inneren, Bonn (West Germany)

SYNOPSIS OF STATE ENVIRONMENTAL PROTECTION MEASURES TAKEN IN SELECTED INDUSTRIALIZED COUNTRIES (STATE-OF-THE ART IN FEBRUARY 1971). (Synoptische Darstellung staatlicher Umweltschutzmassnahmen in ausgewaehlten Industriestaaten (Stand: Februar 1971)). Text in German. In: Materialien zum Umweltprogramm der Bundesregierung 1971. Umweltplanung. Lower House of Parliament, 6th Session, Document 6/2710, p. 653-658, Oct. 1971.

State environmental protection measures taken, competencies, laws, and organizational resolutions adopted in Austria, Belgium, Denmark, France, Great Britain, Japan, the Netherlands, Norway, Romania Sweden, Italy, Switzerland, USSR, and USA are surveyed.

26763 **APTIC NO. 47971**

Bundesministerium des Inneren, Bonn (West Germany)

SYNOPSIS OF THE ENVIRONMENTAL PROTECTION MEASURES TAKEN IN THE GERMAN DEMOCRATIC REPUBLIC. (Synoptische Darstellung der Umweltschutzmassnahmen in der DDP). Text in German. In: Materialien zum Umweltprogramm der Bundesregierung 1971. Umweltplanung. Lower House of Parliament, 6th Session, Document 6/2710, p. 659-661, Oct. 1971.

A synopsis is given of the competencies of different ministries and organs of the government in matters of environmental protection, and of environmental protection measures taken in East Germany. With the Council of Ministers having coordinating power, central organs of government subordinate to the cabinet are required to consider environmental aspects in planning and management. The Ministry of Public Health is responsible in matters of air pollution and noise. Legislation in the fields of clean air maintenance, noise abatement, water protection, and waste disposal is surveyed. No data on pesticides, environmental chemicals, or expenditures for environmental protection are available.

26764 **APTIC NO. 48354**

National Academy of Engineering, Washington, D. C., Committee on Power Plant Siting

ENGINEERING FOR RESOLUTION OF THE ENERGY-ENVIRONMENT DILEMMA: A SUMMARY. (FINAL REPORT). National Science Foundation and Atomic Energy Commission Contract NSF-C310, Task Order 204, Rept. NAE-COPPS-71-1, 63p., Dec. 1971. 32 refs.

NTIS: PB 205326

Power plant siting requirements in relation to potential adverse effects on the environment and engineering approaches to their mitigation were examined in a year-long study and are summarized. Policy recommendations include consolidated certification procedures, priority research and development, organization and funding, public information, environmental standard development, and electric energy in relation to the total energy array. Aspects of environmental protection investigated included air and water quality, radiological parameters, aesthetics, and land use.

SOCIAL ASPECTS

1972

26765 **APTIC NO. 48447**

Schofield, Norman

THE LOGIC OF COLLECTIVE ACTION AND THE LAW OF THE COMMONS. Preprint, Inst. of Management Sciences, Pleasantville, N. Y., 20p., 1972. 14 refs. (Presented at the Institute of Management Science, International Meeting, 19th, Houston, Tex., April 4-8, 1972.)

Game theory is utilized to give an indication of the possible reaction of countries when faced with a non-renewable resource shortage. The developed countries of the world represent the advantaged players, with the underdeveloped countries resembling the disadvantaged players. For underdeveloped countries, it is seen as imperative that growth is maintained, which implies an increasing use of raw resources. The developed world also emphasizes growth to maintain its position and keep pace with the rising level of expectation of its citizens. As natural resources are depleted, then the investment required to extract the raw resources increases, and the ratio of return over investment decreases. A Law of the Commons is consequently formulated: individuals or countries when unconstrained and motivated by self interest, will choose strategies that are incrementally rational but globally, and collectively, irrational. A full environmental game must involve individual strategy choices including decisions of such matters as capital investment, pollution reduction, and population stabilization, as well as resource depletion. The dynamics of collective behavior is discussed in terms of models, based on the concept that rational individuals will seek to avoid the obligations necessary for the common good.

GENERAL

1972

26766 **APTIC NO. 47841**

Johnson, H. D.

BIOMETEOROLOGY. A MULTIDISCIPLINARY SCIENCE. Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 202-203, 1972. 2 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)

Biometeorology is a multidisciplinary science based upon interactions between organisms and their atmospheric environment. Numerous biometeorological problems include weather studies, interactions of climate with atmospheric pollutants, the effects of climate on life cycles of disease organisms, and the physiological mechanisms of biometeorological actions on plants, animals, and man. To most effectively investigate the mechanisms and relationships of organisms to their ecological environment and to resolve environmental pollution problems, related environmental sciences must seek the answers cooperatively.

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